FINAL
NAVAL AIR STATION ALAMEDA RESTORATION ADVISORY BOARD
MEETING SUMMARY

http://www.efdsw.navfac.navy.mil/environmental/AlamedaPoint.htm

Building 1, Suite 140, Community Conference Center
Alameda Point
Alameda, California

February 10, 2004

The following participants attended the meeting:

Co-Chairs:

Thomas Macchiarella	Community Co-Chair, Naval Facilities Engineering Command, Southwest Division (SWDIV), Base Realignment and Closure (BRAC) Environmental Coordinator (BEC)
Jean Sweeney	Restoration Advisory Board (RAB) Community Co-chair

Attendees:

Janet Argyres	Bechtel National Inc. (Bechtel)
Susan Boyle	United States Coast Guard (USCG)
Dave Cacciatore	The Shaw Group Inc. (Shaw)
Glenna Clark	SWDIV Remedial Project Manager (RPM)
Debbie Collins	Community Member
Neil Coe	RAB
Tracy Craig	Tetra Tech EM Inc. (Tetra Tech)
Ardella Dailey	Alameda Unified School District (AUSD)/RAB
Douglas DeHaan	RAB
Claudia Domingo	SWDIV RPM
Tony Dover	RAB
Judy Huang	Regional Water Quality Control Board (RWQCB)
George Humphreys	RAB
Rezsin Jaulus-Gonzalez	Alameda Point Collaborative (APC)
Eric Johansen	Bechtel
Elizabeth Johnson	City of Alameda
Beth Kelly	Tetra Tech
James D. Leach	RAB
Marcia Liao	Department of Toxic Substances Control (DTSC)
Lea Loizos	ARC Ecology/RAB
John McGuire	Shaw
Rudy Millan	Shaw
Bert Morgan	RAB
Darren Newton	SWDIV RPM
Lona Pearson	Tetra Tech
Kurt Peterson	RAB
Kevin Reilly	RAB
Mark Ripperda	U.S. Environmental Protection Agency (EPA)
Michael Schmitz	The Sanz Group, Inc.
Tony Searls	Shaw

Dan Shafer	Shaw
Dale Smith	Sierra Club/RAB
Jim Sweeney	RAB Vice Co-chair
Anthony Talamantez	Engineering Remediation Resources Group, Inc.
Luann Tetirick	RAB
Michael John Torrey	Housing Authority of the City of Alameda/RAB

MEETING SUMMARY

I. Approval of Minutes

Ms. Sweeney, Community Co-chair, called the meeting to order at 6:35 p.m.

Ms. Sweeney asked for comments on the January 6, 2004, RAB meeting minutes; however, Mr. Humphreys, noted the following comment to the revised version of the December 2, 2003 RAB meeting minutes:

- On page 2 of 11, first bullet, "…during heavy rains and arise the water table." Should now be revised to "…during heavy rains and a rise in the water table."

However, since the December 2, 2003 RAB meeting minutes are finalized and posted on the website, and since the comment does not change the context of the subject matter, the noted comment will be identified only in this month's meeting minutes.

The January 6, 2004 meeting minutes were approved, with corrections made by Mr. Torrey, Mr. Humphreys and Ms. Smith.

Mr. Torrey requested that the meeting minutes be repaginated correctly at 10 pages total, not 11 pages.

Mr. Humphreys, made the following comments:

- On page 3 of 10, second bullet, "…Dense Nonaqueous Petroleum Liquid…" should be revised to "…Dense Nonaqueous Phase Liquid…"

- On page 6 of 10, fifth paragraph, "…benzene or naphthalene by analyzing its specific components to determine if its origination is…" should be revised to "benzene or naphthalene plumes by analyzing the relative concentrations of specific components to determine whether their origin is…"

- On page 7 of 10, first paragraph, fifth sentence, "…a few months back Catellus petitioned to remove the warehouses from being a…" should be revised to "a few months back the City petitioned to remove the warehouses as a…"

- On page 7 of 10, first paragraph, last sentence, "…a continuation of the plume into the warehouses." Should be revised to "…a continuation of the plume into the warehouse area."

- On page 7 of 10, second paragraph, last sentence, "…she also resides on the Alameda Annex RAB…" should be revised to "…she also participates on the Alameda Annex RAB…"

- On page 10 of 10, third paragraph, fourth sentence, "…changing two values used in the original cost comparison…" was revised to "…changing either of the two assumptions used in the original cost comparison…"

Ms. Smith, made the following comment:

- On page 9 of 10, fourth paragraph, second sentence, "…aviation gas, the Navy would…" was revised to "…aviation fuel, the Navy would…"

II. Co-Chair Announcements

Ms. Sweeney made the following announcements.

A letter was received from Dr. Alan Nishino, Superintendent of AUSD, regarding the recent RAB monthly meeting date change. In the letter, Dr. Nishino stated that it is essential to have AUSD representation at the RAB meetings. The new RAB meeting dates conflict with the AUSD meeting dates, and RAB member, Ms. Dailey, also attends the AUSD meetings. Dr. Nishino's letter requested that the scheduled dates for RAB meetings be revisited as an agenda item at the March 2004 RAB meeting. Ms. Dailey requested that the date change item be placed early on the agenda so that she may attend the entire discussion, although if she cannot attend she will send in a proxy vote.

Mr. Macchiarella stated that he contacted several RAB and regulatory members about their availability throughout each month. The first Thursday of each month seems to be the most probable choice for the date change.

Ms. Sweeney called for a motion to include the date change discussion as an agenda item at the March 9, 2004 RAB meeting, the motion was seconded and passed.

Ms. Sweeney stated that the following documents are available for review in the Information Repository:

- Final Corrective Action Plan for Corrective Action Area 4C, dated January 7, 2004

- Time Critical Removal Action for the Building 195 Pesticide Shed Demolition and Soil Removal, Final Site Closeout Report, dated February 5, 2004

- In-Situ Chemical Oxidation (Chem Ox) Pilot Testing at Installation Restoration (IR) Site 4, Final Workplan, dated January 22, 2004

Mr. Macchiarella made the following announcements.

There are several upcoming document submittals expected in February and March 2004.

- Draft Remedial Investigation (RI) for Operable Unit (OU) 1, Sites 6, 7, 8, and 16
- Draft Final Site 29 Skeet Range RI
- Draft Final Site 28 RI
- Site 32 RI Work Plan
- Draft OU-2A RI, Sites 9, 13, 19, 22, and 23
- Draft OU-2B RI, Sites 3, 4, 11, 21
- Site 27 Work Plan Addendum

A current (as of January 2004) electronic searchable file of the administrative record has been installed on the repository library computer. A current hard copy also will be brought to the BRAC Cleanup Team (BCT) meeting for the regulators. The electronic file and hard copy will be updated on a quarterly basis.

The Site 25 soil feasibility study (FS) response to comments (RTC) presentation originally planned for February's RAB meeting will not be ready until March or April 2004, because some comments require additional work at the site. The Navy also is considering combining the presentation of the Site 25 soil FS with the Site 25 and Alameda Annex IR-02 groundwater RI/FS.

The Agency for Toxic Substances and Disease Registry (ATSDR) is writing a public health report for Alameda Point and Alameda Annex, which they conduct for all National Priority List (NPL) sites. The ATSDR requested a list of the RAB members mailing addresses so that they can send each RAB member the report and other environmental information relating to Alameda Point. Because the ATSDR is not a private agency, Mr. Macchiarella assumed that the RAB members would wish to receive the information; the RAB members agreed to be included on the mailing list. The ATSDR also plans to place notices of the report release in the local newspapers. Mr. Ripperda noted that the ATSDR is reporting on current pathways and not on potential or assumed pathways.

Mr. Newton recently prepared a fact sheet to inform the public about sparging technologies currently being considered as remedial alternatives for groundwater at Alameda Point Site 25/Annex IR-02, and to explain the differences between air sparging and biosparging. A handout was provided and is included as an attachment to these minutes. Mr. Leach pointed out that on page 2 of the handout, the air injection rates of 1.5 to 6 cubic feet per minute should related to the area or volume affected.

Ms. Sweeney stated that she received an e-mail from RAB member Ingrid Baur requesting removal from the RAB and the RAB mailing list due to illness; no other information was provided.

III. Status of New Installation Restoration (IR) Sites 30 - 35

Mr. Newton introduced Mr. Johansen to present the status of the new IR sites. A handout was provided and is included as an attachment.

Mr. Johansen stated that six new IR sites have been added to the Comprehensive Environmental Response, Compensation Liability Act (CERCLA) program. The new sites have been added to the CERCLA program because recent investigations and Environmental Baseline Survey (EBS)

data indicate that potential environmental concerns exist in the soil and/or groundwater. RIs are necessary to assess potential risks to human health and the environment. A description of each site location, potential or known contaminants found during recent investigations, and site status are summarized below.

- Site 30 – Miller School includes George P. Miller Elementary School and the Woodstock Child Development Center. Polynuclear aromatic hydrocarbons (PAH) were detected in soil, and low levels of benzene and solvents were detected in groundwater. PAHs likely are from contaminated fill material, and groundwater contamination is likely from an offsite source, such as the Site 25/IR 02 plume. The site investigation (SI) is in progress and funding for the RI is being procured.

- Site 31 – Marina Village is the U.S. Coast Guard (USCG) housing area located south of Site 30. PAHs were detected in soil and low levels of benzene were detected in groundwater. The sources are likely the same as those identified for Site 30. The SI is in progress.

- Site 32 – Northern Ordnance Storage Area is located in the northwestern area near the Oakland Inner Harbor. The site was used for weapons, equipment and aircraft storage, and contained two former underground storage tanks. The volatile organic compounds (VOC) benzene and chlorobenzene and other chlorinated solvents were detected in groundwater. The Navy is preparing a work plan to perform RI sampling.

- Site 33 – South Tarmac and Runway Wetlands is located in a portion of the southern runway and runway wetlands west of and adjacent to the Seaplane Lagoon (SPL). PAHs were detected above screening levels in soil samples along the runway. A risk assessment previously conducted for the wetlands indicated no significant risks to human or ecological receptors; however, some outstanding agency issues are yet to be resolved. A SI report is in progress.

- Site 34 – Former Northwest Shop Area is located between Sites 14 and 15 in the northern portion of Alameda Point. Historically it was used for industrial purposes. The EBS reported polychlorinated biphenyls (PCBs) above screening levels and arsenic above background levels in soil samples. The SI report is in progress.

- Site 35 – West Housing Area is located in economic conveyance parcel (EDC)-5. PAHs were detected above screening levels in soil, which initiated a Time Critical Removal Action (TCRA) in 2003. The boundaries of the site will be refined during the SI phase, which is in progress. The Navy has funding to start the RI after completion of the SI.

Mr. Reilly asked why Sites 30 and 31 are being addressed as separate sites since the contamination sources are the same and the sites are adjacent. Mr. Johansen replied that the sites have two different planned uses. Mr. Macchiarella stated that he would be able to answer that question after he reviews the paperwork on the site designations.

Ms. Sweeney asked what issues are at Site 33 that need to be resolved. Mr. Johansen replied that there are some potential ecological risk issues regarding metals.

Mr. DeHaan asked if there has been sampling conducted underneath the runway at Site 33. Mr.

Johansen replied that sampling has been conducted along the runway but not underneath.

Mr. Humphreys asked how the irregular shape of Site 33 was determined. Mr. Johansen stated that the shape is based on boring points along the runway that exceeded the sampling criteria. Mr. Macchiarella stated that sampling points outside of the site did not exceed the sampling criteria. Mr. Johansen stated that the sampling was conducted on an approximate 80-boring grid that equaled approximately 1 boring for every 5 acres.

Mr. Macchiarella commented that the current Site 35 boundaries are preliminary, and that the site is expected to be reduced significantly after completion of the SI, because most of the PAHs in soil were removed during the 2003 TCRA.

Mr. Reilly asked how many residents live within Site 35. Ms. Jaulus-Gonzalez replied that there are approximately 600 residents living within Site 35, of which half are children.

Mr. Johansen announced a tentatively proposed RI schedule for the new sites. The RI schedule is listed on page 9 of the presentation handout.

Ms. Dailey inquired about the timeline for Site 30. Mr. Macchiarella replied that Site 32 is currently in procurement to be funded, after which a work plan will be prepared and reviewed by the regulators and the RAB. Mr. Newton stated that the RI should start in late summer 2004. Ms. Dailey stated that there have been problems with communication of schedules in the past. Because the child development center is open year round, communication of the proposed activities at Site 30 is vital. Mr. Macchiarella stated that the schedule would be announced after the contract is awarded.

A community member requested an explanation of the SI process. Mr. Johansen stated that typically a SI is a screening level report that indicates whether or not a problem exists and needs to be addressed in a RI. However, the SI reports for these new sites contain more information than a typical SI because more historical information is being used and more extensive risk assessments are being conducted.

Mr. Peterson commented that since Site 31 is a residential area, it should be a higher priority than Site 34, which is not. Mr. Macchiarella replied that many factors determine the priorities and schedules. Site importance, risk, reuse schedules, transfer timing, and funding are some of the factors that determine a site's schedule. Mr. Ripperda commented that Site 34 does not have severe issues and should be transferred rapidly. At Site 31, the RI schedule is in progress and SI sampling is being conducted for PAHs, one of the risk drivers. Because work is being conducted at Site 31, it could be a RAB agenda item and PAH sampling results could be presented.

Mr. DeHaan commented that the community may not agree with how priorities are being set and is unaware of any priorities that the RAB has set. In addition to the regulators, the Navy, and the City, the RAB should be more involved in the decisions regarding site scheduling. He stated that he believes there is substantial work to be done at Site 34 that will take time to complete.

Mr. Ripperda commented that there are no real issues at Site 34. Some sampling is needed, but conducting work at Site 34 sooner will not delay work at other sites. Mr. DeHaan stated that the funding for Site 34 could go to a site regarded by the community, as a higher priority. When funding becomes an issue, the RAB should have some input on which sites should receive

funding. Mr. Ripperda replied that the Navy probably should explain their reasoning behind site scheduling to the community. Mr. Macchiarella agreed that an explanation of the site scheduling process would be a good idea.

Ms. Johnson commented that the City evaluates the site priorities with the Navy during BCT meetings and also during monthly coordination meetings. The monthly coordination meetings usually cover transfer negotiations. The City has requested that EDC-5 be transferred first.

Ms. Dailey requested clarification on the delay of addressing PAHs in soil at Site 30.
Mr. Peterson also asked if the PAHs at Site 30 were discovered during recent sampling.
Mr. Johansen replied that several phases of sampling have been conducted. The first phase conducted in 2002 did not indicate a problem, but only a few samples were collected. During follow up PAH sampling in October 2003 the problem was discovered.

Ms. Dailey stated that she does not want activities at Site 25 to be delayed in favor of activities at Site 30. Mr. Newton replied that Site 25 is continuing on track and is now in the FS stage for soil, and the RI/FS stage for groundwater.

Mr. Ripperda asked when the PAH sampling results for Sites 30 and 31would be available to the RAB. Mr. Macchiarella replied that the results should be available in the field activity reports this spring.

Mr. Humphreys asked if any new sites would be added to Alameda Annex, specifically in the former warehouse area because of the benzene/naphthalene groundwater plume.
Mr. Macchiarella replied that no new sites would be added in that area; the Site 25 and Alameda Annex IR-02 combination site captures the groundwater plume in that area. Mr. Humphreys expressed concerns about the new Catellus residential development being constructed near the existing groundwater plume.

Mr. DeHaan commented that there is considerable soil movement occurring in the former warehouse area of Alameda Annex. Mr. Macchiarella replied that the Alameda Annex topics could be discussed at the Alameda Annex RAB meetings, which are held on the second Wednesday of each month. The next meeting is tomorrow morning.

Mr. DeHaan asked if there are any regulators who work on both RABs. Ms. Huang replied that she is the only regulator that participates on both RABs, but that her involvement with the Alameda Annex only spans 2 years. When she began working on the Alameda Annex the benzene plume was being investigated. Now remediation of the benzene plume is being proposed and residential construction is being conducted. Active groundwater remediation does not always exclude building construction.

Mr. DeHaan asked Ms. Huang if the soil being moved from the warehouse area and piled 20 feet high is a concern. Ms. Huang replied that excavated soil would be characterized and disposed of properly. The large soil pile observed is surcharge soil that is not a result of site excavation. The surcharge is actually a pile of soil and heavy construction debris that is moved around to help stabilize and settle the land.

Mr. Humphreys asked if the surcharge soil has been sampled for contaminants. Mr. Macchiarella stated that surcharge is primarily broken concrete and rubble. The construction workers and

equipment operators are aware that they could potentially come in contact with contaminated soil. However, plans are in place to address the issue if it arises and also dispose of the soil properly.

Mr. DeHaan commented that he is concerned that the groundwater benzene plume extends beyond Site 31. Ms. Domingo replied that the plume has been delineated, is not migrating, and is being monitored under the basewide groundwater-monitoring program.

Mr. Peterson asked what kind of testing, if any, has been conducted in the former warehouse area. Mr. Macchiarella replied that an Alameda Annex project manager is not in attendance to answer his question, but the main project manager is expected to be in attendance tomorrow at the Alameda Annex RAB meeting to answer questions.

Mr. Peterson asked Mr. and Mrs. Sweeney if they have any information since they have attended the Alameda Annex RAB meetings for a long time. Ms. Sweeney replied that the developer, Catellus, stated at the last meeting, that a spill was found along drain lines near the east end of Building 970 leading to IR-02. Catellus also had stated that more detailed information would be provided at the next Alameda Annex RAB meeting.

IV. In-Situ Chemical Oxidation Pilot Scale Tests

Ms. Clark introduced Mr. Shafer to provide an update on the chem-ox pilot scale tests at IR Sites 9, 11/21, and 16. A handout was provided and is included as an attachment to these minutes.

Mr. Shafer stated that the main objectives of the project were to conduct bench scale tests to evaluate the effectiveness of various oxidants for reducing chlorinated compounds in groundwater, evaluate the effectiveness of the chosen oxidant in groundwater at the selected sites, evaluate the radial effects of the injected oxidant, and determine the most effective injection approach.

Mr. Shafer stated for the sites evaluated, Sites 9, 11/21, and 16, there are five test areas. Site 9 (Building 410 Paint Stripping Facility) was evaluated in two areas: Site 9 Shallow (upper 15 feet), and Site 9 Intermediate (22 to 42 feet below ground surface [bgs]). Site 11/21 (Building 14 Engine Test Cell/Building 162 Ship Fitting and Engine Repair) was evaluated at a depth of 22 to 42 feet bgs. Site 16 (C2 Container Storage Area [CANS] and Hobby Shop) was evaluated in two areas within the upper 15 feet; one area in the north (16 North), and the other in the south (16 South).

Mr. Shafer described the pilot test locations within each of the sites while referring to Figures 2, 3, and 6 of the handout. He stated that Site 9 Shallow is located on the east side of Building 410 and is currently used as boat storage by Nelson Marine. Site 9 Intermediate is located on the west side of Building 410 in the parking lot of Building 166. Site 11/21 is near the entrance to the base, south of Atlantic Avenue. Site 16 North is located west of the CANS and Site 16 South is located at the Hobby Shop Facility, south of the CANS.

Mr. Shafer described the following main chemicals of potential concern (COPC) that were detected during the investigation stage of the pilot tests at each site.

- Site 9 Shallow – Trimethlybenzene (TMB) and vinyl chloride (VC)
- Site 9 Intermediate – 1,1-Dichloroethane (1,1-DCA)

- Site 11/21 – Trichloroethene (TCE)
- Site 16 North – 1,2-Dichlorobenzene (1,2-DCB)
- Site 16 South – Tetrachloroethene (PCE), TCE, and cis-1,2-dichloroethene (cis-1,2-DCE)

Mr. Shafer stated that during the bench scale tests, soil and groundwater samples from the sites were treated in a laboratory setting with oxidants that generally are effective on VOCs. The oxidants that were evaluated include potassium permanganate, ozone, sodium persulfate, hydrogen peroxide, and Fenton's Reagent (hydrogen peroxide with ferrous iron). Based on the results of the testing, Fenton's Reagent was determined to be the most effective in reducing the concentrations of COPCs.

A modified Fenton's approach was selected for the pilot scale tests. The modified Fenton's approach uses a low-pressure injection of 12 percent hydrogen peroxide followed by a chelated iron catalyst. The modified Fenton's approach involves neutral pH conditions, and causes only a moderate temperature increase (less than 25 degrees Fahrenheit [F]). The classic Fenton's approach uses an injection of 12 percent hydrogen peroxide combined with ferrous iron and acid. In addition, the classic approach requires acidification of the groundwater to attain a pH of less than 3, and causes temperature increases of about 180 degrees F. The classic Fenton's approach was eliminated from further consideration, because both the groundwater acidification and the temperature increases were viewed as unfavorable conditions that could produce potential health and safety concerns.

Mr. Torrey asked for a description of chelated iron. Mr. Shafer stated that it is basically a food grade iron additive that has been formulated into a proprietary blend for the modified Fenton's approach.

Ms. Sweeney asked what kind of chemical reaction occurs between the hydrogen peroxide and the chelated iron. Mr. Shafer replied that the peroxide reacts with the iron catalyst to form hydroxyl radicals. The hydroxyl radicals then break down the chlorinated compounds.

Mr. Humphreys asked why the Fenton's application uses a low-pressure injection. Mr. Shafer explained that hydrogen peroxide is first injected into a closed well system followed by a clean water flush to spread the peroxide into the groundwater formation. The iron catalyst is then injected into the well and is followed again by a water flush. When these compounds meet, hydroxyl radicals are formed. The pressure is used to force the hydrogen peroxide and iron catalyst down into the formation.

Mr. Reilly asked what by-products are formed from the reaction. Mr. Shafer replied carbon dioxide (CO_2) and water. Mr. Humphreys asked about chlorine by-products, like vinyl chloride. Mr. Shafer stated that the process breaks down vinyl chloride and does not form new chlorinated compounds. Mr. Ripperda commented that when the process works the chlorinated compounds can be transformed into CO_2 and water. Some chloride ions will be present but in the parts per billion (ppb) range, which will cause only slight increases in natural chloride concentrations, which are in parts per million (ppm) range.

Mr. Shafer stated that the pilot scale tests were initiated in November 2002. Design data were collected using a cone penetrometer (CPT) and a Hydropunch™ for Sites 9 and 16, and previously collected data were used for Site 11/21 to determine injection and monitoring well placement. One injection well was installed per test area and monitoring wells were installed at

various distances from each injection well to evaluate the radius of influence. Aquifer testing was conducted to evaluate the hydraulic parameters of the aquifer. Baseline samples were collected and analyzed for VOCs, semivolatile organic compounds (SVOC), metals (including hexavalent chromium), and total organic carbon. One week's worth of injections was conducted at all the test areas. One week later, post injection groundwater sampling was conducted, and was then continued once a week for a total of 4 weeks to determine the effectiveness of the pilot scale test.

Mr. Shafer stated the results of the pilot scale tests at Site 9 varied by test area.

- Site 9 Shallow had a radius of influence of up to approximately 23 feet from the injection well with an overall reduction of contaminant concentrations between 51 to 60 percent.
- Site 9 Intermediate had some surfacing of chemicals occur during the injection. The net reduction of contaminant concentrations was 0 to 26 percent. Because an insufficient quantity of oxidant was injected due to surfacing, the results at Site 9 Intermediate were inconclusive.

Mr. Humphreys commented that at Site 9 Shallow, vinyl chloride declined the first week and then appeared to remain steady each week thereafter. Mr. Shafer replied that the application was a one-event application for pilot test purposes. Typically, for a full-scale application of Fenton's Reagent or other chem-ox methods there would be multiple injection events. This one-time application was a success since it resulted in a 51 percent reduction.

Ms. Sweeney asked why surfacing was more of a problem at intermediate depths than at shallow depths. Mr. Shafer replied that it depends on the subsurface conditions not the depth of the well; the injected oxidant will follow the path of least resistance.

Mr. Shafer provided the following results for the areas at Site 11/21 and 16:

- Site 11/21 had a radius of influence up to 31 feet from the injection well. Some monitoring well results indicate TCE decreased and some indicate increases after week four. In areas of high VOC concentrations (i.e., near or exceeding DNAPL-range of 10,000 ug/L), the first round of injections might cause chemicals to desorb from the soil and result in higher groundwater concentrations before decreasing, as shown in these results.
- Site 16 North had a radius of influence of at least 11.5 feet with an overall reduction of contaminant concentrations between 93 and 95 percent. Although the initial site concentrations were low compared to other sites, this site shows the most successful application in terms of dispersement into the formation.
- Site 16 South had a radius of influence of approximately 18.5 feet with an overall reduction of contaminant concentrations between 89 and 95 percent.

Mr. Shafer stated that the field summary report, dated July 4, 2003, contains the pilot study findings and recommendations. Sites recommended for full-scale application include Site 9 Shallow, Site 16 North and Site 16 South. Because of surfacing, construction of a new injection well configuration and another pilot test at Site 9 Intermediate was recommended and is currently in progress. For Site 11/21, a pilot test was recommended upgradient at Site 4 with multiple injection events. This pilot test is currently in progress, and the preliminary results are promising.

Ms. Sweeney asked if the application stops working by week four. Mr. Shafer replied that based on the baseline concentrations and with one injection event, the process will have run its course by the second week.

Mr. DeHaan asked where the process goes from here and if it is effective. Mr. Shafer replied that the process is very effective and is currently being conducted full scale at three sites, 9 Shallow, 16 North, and 16 South. The pilot test is being redone at Site 9 Intermediate, and a pilot test is being conducted upgradient of Site 11/21 at Site 4. Fieldwork should be completed in March or April 2004.

Mr. DeHaan asked if the technology could be used at other sites similar to these. Mr. Shafer replied that there are other sites with VOC contamination. However, each site should be considered individually.

Ms. Loizos asked if the term "full-scale" means that the process is addressing the entire plume area. Mr. Shafer replied that a mass reduction of VOC concentrations is the main goal of these removal actions; it is not the final remedy. Final remediation cannot be conducted until after the FS and ROD.

V. In-Situ Six-Phase Heating Pilot Studies Update

Ms. Clark introduced Mr. Millan to present a summary of the six-phase heating pilot test results at groundwater plume 5-1 and 5-3 in Site 5. A handout was provided and is included as an attachment.

Mr. Millan described six-phase heating technology as an aggressive method of removing VOCs from the subsurface soil. The ground is heated by applying electrical currents; steam is generated from the heat and provides transportation of the VOCs to the surface. Vapor extraction is then used to remove the steam and contaminants. The heat is applied directly into the ground by six electrodes. The six-electrode design provides an evenly distributed and rapid heating pattern. Specialized electrical equipment and a condensing vapor extraction treatment system are required.

Mr. Millan explained that the pilot test was conducted over a six-month duration and consumed about 420,000 kilowatt-hours (kWhrs) of electricity. The short-term effectiveness of the test was 99 percent of the mass removed. Since the entire plume was not treated, rebound occurred after 6 months in the pilot test area. The effectiveness after rebound was measured at 86 percent. During the pilot test the ground temperature was raised for approximately 5 months from 22 degrees Celsius (deg C) to an average temperature of 92 deg C and then maintained for one month ending in December 2002. Since December 2002 the ground temperature has steadily declined.

Mr. Millan stated that two DNAPL plumes have been delineated at Site 5. The pilot scale test is considered successful and has produced a good data set that was used to design a full-scale application. Currently, the full-scale application is being mobilized. The two plumes that will be treated are Plume 5-1 and Plume 5-3. The full-scale design for Plume 5-1 is complete and construction is 95 percent completed.

Mr. Leach asked how the vapor is collected or trapped. Mr. Millan replied that the vapor is not trapped; a vacuum is applied to the soil above the groundwater table using a number of shallow (about 5 feet bgs) extraction wells. The vacuum causes the vapors to migrate to the extraction wells and the vapor is removed from the ground, condensed and passed through carbon treatment tanks where the contaminants are absorbed onto the carbon. Spent carbon is sent to a recycler, where it is cleaned for reuse.

Ms. Sweeney asked if the test area has a concrete floor. Mr. Milan replied that the entire floor area is concrete. The electrodes and extraction wells are installed through the concrete and sealed.

Mr. Peterson asked what percentage of the entire plume the pilot scale test covered. Mr. Millan replied that the pilot scale test area is about 1/10 of the plume.

Mr. Milan stated that the area of Plume 5-1 is about 1/3 acre and that Plume 5-3 is approximately 1.2 acres. The full-scale application at Plume 5-1 will be conducted in one deployment; Plume 5-3 will be conducted in five deployments.

Mr. Millan stated that this technology is not inexpensive, but it is very cost effective. Traditional removal methods could take 10 to 15 years just to reduce concentrations to a level that eliminates the source of contamination outside of this area.

VI. BCT Activities

Ms. Liao provided an update on the BCT activities, and a handout was provided and is included as an attachment.

Documents

Ms. Liao stated that the regulatory agencies have recently submitted comments on the draft Site 2 geotechnical FS. The EPA and RWQCB have also submitted their comments on the draft Site 25 groundwater RI/FS. DTSC has only submitted partial comments on the draft Site 25 groundwater RI/FS because of unresolved issues regarding Alameda Annex.

Meetings

A scoping meeting and site tour was held on January 14, 2004 to help plan the new Site 2 RI sampling workplan.

A presentation of Site 27 was delivered at the monthly BCT meeting held on January 20, 2004. The Navy proposes to collect supplemental (phase 4) soil and soil gas samples to incorporate into the Site 27 RI.

The BCT also met on February 10, 2004 to discuss the best way to integrate EBS data with new PAH data at eight transfer parcels (see handout for parcel numbers) currently undergoing the SI process. The regulatory agencies are concerned that since the SI may be the last evaluation prior to a finding of suitability to transfer (FOST) the ecological risk and contamination from neighboring sites (groundwater, landfill gas, etc.) should be thoroughly evaluated.

VII. Community and RAB Comment Period

Ms. Johnson stated that she submitted a staff report on the RAB's status and purpose to the City Council's Alameda Reuse and Redevelopment Agency Board (ARRA) in response to their request. After reading the report, the ARRA made a motion to provide ARRA representation on the RAB at their next meeting.

Ms. Loizos stated that the comments on OU-5 by Mr. Kenneth Conner the Technical Assistance for Public Participation (TAPP) Grant contractor and from the RAB focus group are available.

Mr. Ripperda suggested that the questions brought up during the RAB meetings concerning Alameda Annex and other issues that are not answered during the meeting should be e-mailed to the Navy or to the appropriate party to allow the Navy to provide the best information at the following RAB meeting, and to include the right people on the agenda.

Ms. Smith requested that Ms. Sweeney take notes at the Alameda Annex RAB meeting and convey the information to the Alameda Point RAB since she regularly attends the Alameda Annex meetings. Ms. Sweeney replied that she could take notes at the meeting and that others should also attend the meeting in the morning. She also stated that anyone interested in receiving the Alameda Annex RAB meeting minutes regularly could do so.

The meeting was adjourned at 9:15 p.m.

ATTACHMENT A

NAVAL AIR STATION ALAMEDA
RESTORATION ADVISORY BOARD MEETING AGENDA
February 10, 2004

(One Page)

RESTORATION ADVISORY BOARD

NAVAL AIR STATION, ALAMEDA

AGENDA

FEBRUARY 10, 2004 6:30 PM

ALAMEDA POINT – BUILDING 1 – SUITE 140
COMMUNITY CONFERENCE ROOM
(FROM PARKING LOT ON W MIDWAY AVE, ENTER THROUGH MIDDLE WING)

TIME	SUBJECT	PRESENTER
6:30 - 6:40	Approval of Minutes	Jean Sweeney
6:40 - 6:55	Co-Chair Announcements	Co-Chairs
6:55 – 7:25	Status of the Newest IR Sites (Sites 30 –35)	Darren Newton and Eric Johansen (Bechtel)
7:25 – 7:55	Chemical Oxidation and Six-Phase Heating Pilot Studies Update	Glenna Clark and Shaw
7:55 – 8:05	BCT Activities	Marcia Liao (DTSC)
8:05 – 8:30	Community & RAB Comment Period	Community & RAB
8:30	RAB Meeting Adjournment	

ATTACHMENT B

NAVAL AIR STATION ALAMEDA
RESTORATION ADVISORY BOARD MEETING HANDOUT MATERIALS

NAVFAC NAS Alameda/Alameda Annex Biosparging/Air Sparging Technology Fact Sheet dated February 2004. (2 pages)

Status of the Newest IR Sites (Sites 30 through 35), Presented by Eric Johansen, Bechtel Environmental, Inc. February 10, 2004. (9 pages)

In-Situ Chemical Oxidation Pilot Scale Tests IR Sites 9, 11/21, and 16, Presented by Dan Shafer, Shaw Environmental Inc. February 10, 2004. (21 pages)

Six-Phase Heating DNAPL Removal Pilot Test Results IR Site 5, Presented by Rudy Millan, P.E., Shaw Environmental, Inc. February 10, 2004. (14 pages)

BCT Updates for February 2004 RAB Meeting, Presented by Marcia Liao, DTSC. February 10, 2004. (1 page)

Biosparging/Air Sparging Technology Fact Sheet

(2 pages)

NAS Alameda/Alameda Annex Biosparging/Air Sparging Technology

February, 2004

fact sheet

The Navy is providing this fact sheet to inform the local community about sparging technologies which are currently being considered to remediate groundwater at a site within NAS Alameda / Alameda Annex. This fact sheet contains the following information:

- → **What is Sparging, Biosparging and Air Sparging?**
- → **Specific Information on Biosparging**
- → **Specific Information on Air Sparging**

What is Sparging, Biosparging, and Air Sparging?

Sparging is the general term used to describe processes which inject air into soil that is saturated with groundwater (saturated zone) in order to remove contaminants. Biosparging is a specific kind of sparging which injects small amounts of air into contaminated groundwater to stimulate natural biological breakdown. Air Sparging, another specific kind of sparging, injects much larger amounts of air into contaminated groundwater to volatilize contaminants and push them to the surface where they can be collected and treated.

The advantages of both biosparging and air sparging are that excavation is not required, groundwater does not have to be extracted and treated, and the entire process can be done "in situ", or in place.
Though biosparging and air sparging sound similar, there are some very important differences which should be explained for those participating in the cleanup process. This fact sheet is designed to explain those differences in order to assist public participation.

Specific Information on Biosparging

The primary goal of biosparging is to stimulate natural biodegradation of groundwater contamination. Natural biodegradation relies primarily on bacteria and other microbes in the subsurface (in both groundwater and soils), which use the contaminants in groundwater as food sources, along with oxygen and nutrients.

In shallow areas there is usually enough oxygen to support natural biodegradation, but in deeper areas, oxygen may run out, bringing the natural degradation process to a stop. Injecting air into areas with little subsurface oxygen allows natural biodegradation to startup again and continue the remediation process.

If groundwater contamination does not readily volatilize, then very few vapors will be generated by biosparging. If groundwater contamination does readily volatilize, then some vapors may be generated. However, any vapors produced by biosparging would be biodegraded by microbes and bacteria present in soils above the groundwater, and as a result, vapors would not reach the surface. It is therefore important that biosparging systems be designed properly so that only small amounts of air are injected into the subsurface, compared to the larger amounts injected with air sparing systems.

Because biosparging has been tested on numerous other sites, including Corrective Action Area 11 at NAS Alameda, the Navy already has key information

regarding the amount of air which should be injected into groundwater to promote biodegradation without vaporizing contaminants.

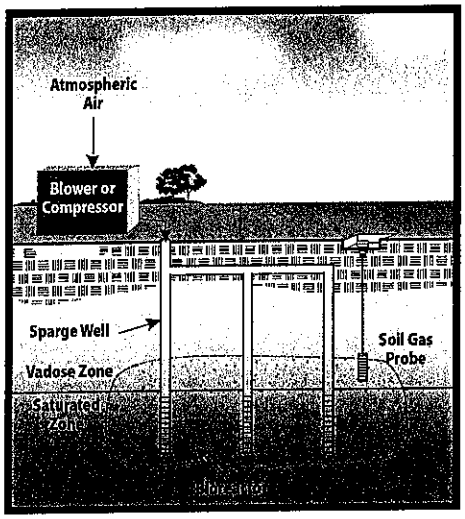


Fig. 1 Biosparging

Typical air injection ranges from 1.5 to 6 cubic feet per minute, and biosparging is usually performed for about two years, followed by groundwater monitoring.

A conceptual drawing of a biosparging system is shown within Figure 1. Additional information can also be found at the following U.S. Environmental Protection Agency website: http://www.epa.gov/swerust1/pubs/tum_ch8.pdf.

Specific information on Air Sparging

Air sparging, like biosparging, injects air into a saturated zone in order to remove contaminants. The difference however, is that air sparging injects much more air into the saturated zone to volatilize contaminants and drive them to the surface where they can be collected and treated. Air sparging systems are often combined with soil vapor extraction (SVE) systems which collected volatilzed contaminants. Typical air injection ranges from 10 to 30 cubic feet per minute. Air sparging has also been used previously at many sites, including Corrective Action Area 7 at NAS Alameda, and has been found to be very effective for shallow contamination which readily vaporizes. Air sparging also helps subsurface bacteria and microbes with the natural degradation process, but the primary goal of air sparging is to vaporize and recover contamination, not to biodegrade it. A conceptual drawing of the air sparging process is shown within Figure 2.

Air sparging is typically appropriate at sites where groundwater contamination readily volatilizes, and there is little concern about driving vapors toward the surface for collection (such as buildings or other structures.

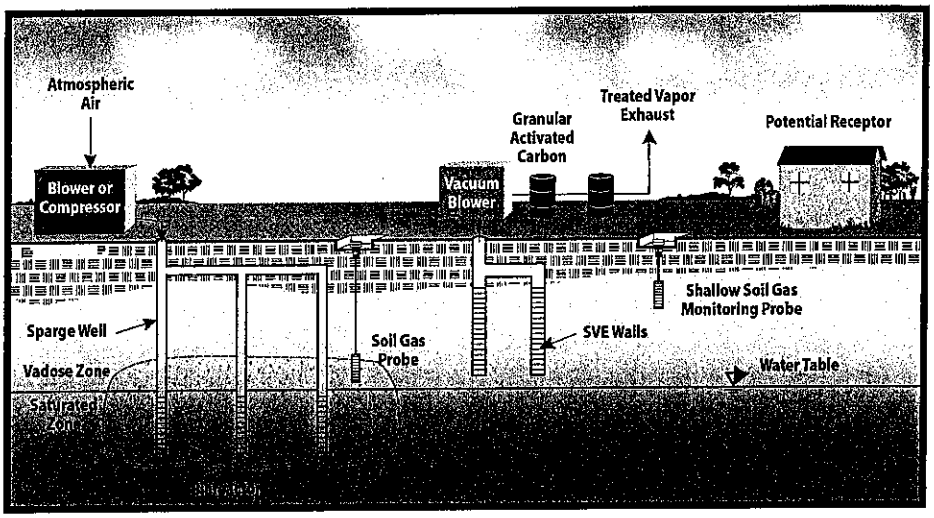


Fig. 2 Air Sparging

At sites where there is concern about generating vapors, then biosparging can be used instead of air sparging. Air sparging is also more expensive than biosparging and requires an on-site treatment system.

FOR MORE INFORMATION PLEASE CONTACT:

Mr. Thomas Macchiarella
BRAC Environmental Coordinator
Phone: (619) 532-0907
http://www.efdsw.navfac.navy.mil/environmental/alamedapoint.htm

Status of the Newest IR Sites (Sites 30 through 35)

(9 pages)

ALAMEDA POINT

Status of the Newest IR Sites (Sites 30-35)

Restoration Advisory Board (RAB) Meeting

February 10, 2004

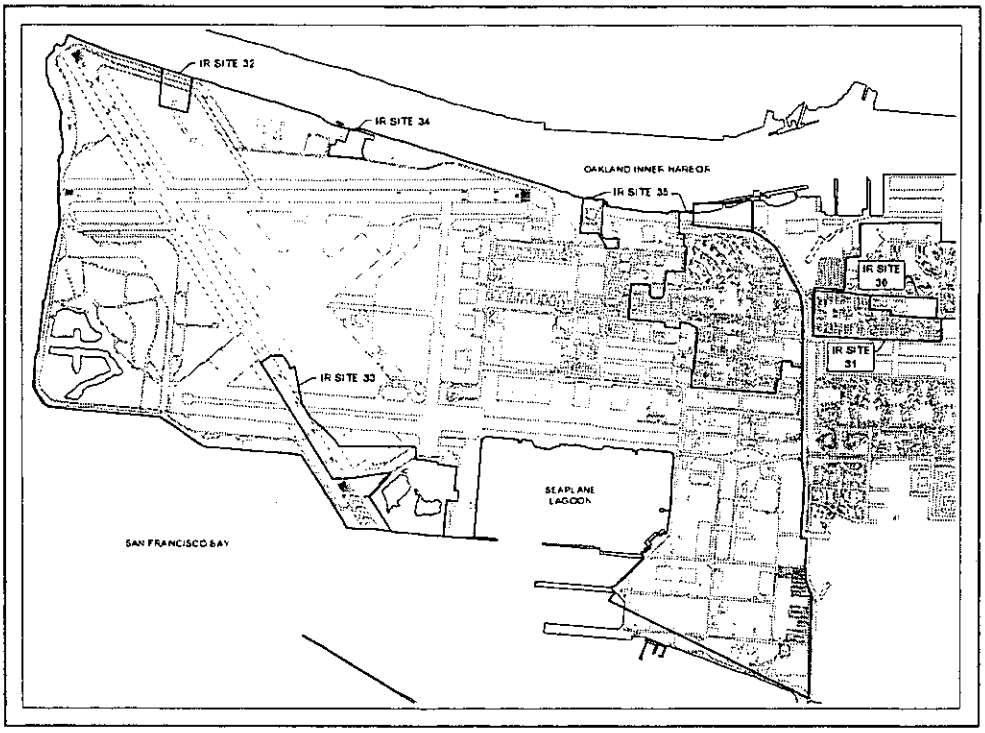
Darren Newton, SWDIV
Eric Johansen, Bechtel Environmental

1

ALAMEDA POINT

- IR Site 30 – Miller School
- IR Site 31 – Marina Village
- IR Site 32 – Northern Ordnance Storage Area
- IR Site 33 – South Tarmac and Runway Wetlands
- IR Site 34 – Former Northwest Shop Area
- IR Site 35 – West Housing Area

2



ALAMEDA POINT

Agenda

- Why new IR sites?
- Description of each new IR site
  - Site use
  - Chemicals of concern
  - Current status of investigations
- Proposed schedule

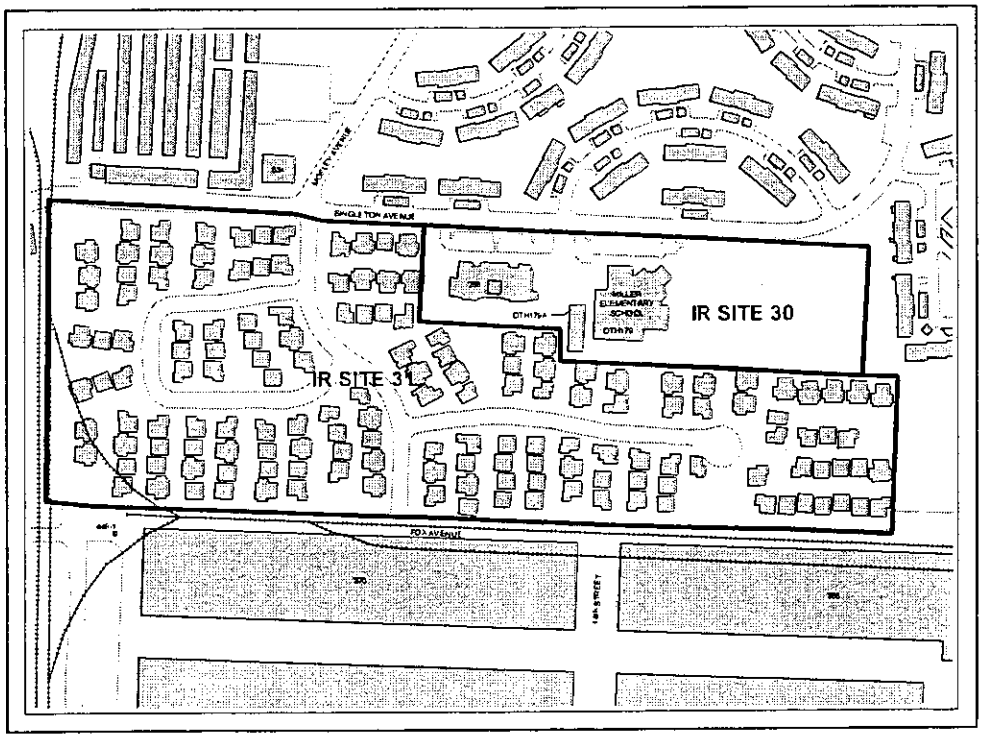
4

ALAMEDA POINT

Why new IR sites?

- Recent investigations indicate potential environmental concerns in soil and/or groundwater
- Evaluation of Environmental Baseline Survey (EBS) data in the Site Inspection (SI) reports
- Remedial investigations are necessary to fully assess potential risks to human health and the environment

5



ALAMEDA POINT

IR Site 30 - Miller School

- George P. Miller Elementary School and Woodstock Child Development Center
- Recent investigations indicate 19% of soil samples were above screening levels for of polynuclear aromatic hydrocarbons (PAHs)
- PAHs in soil are likely from hydraulic fill
- Low levels of benzene and solvents in groundwater
- GW contamination likely from an offsite source
- Navy procurement for RI in progress

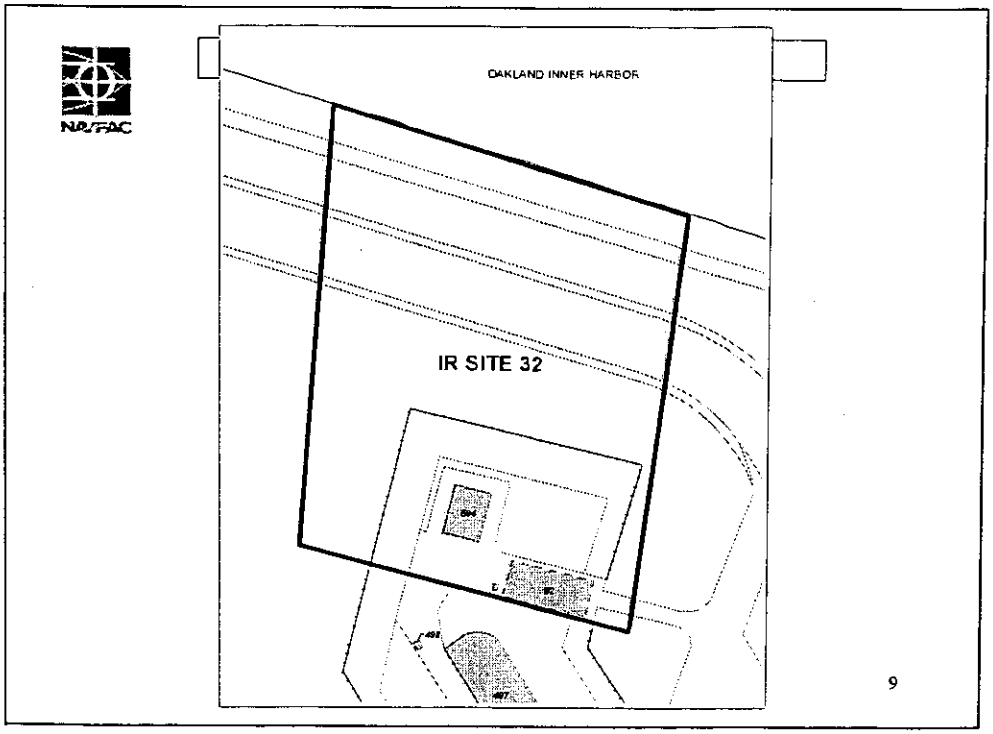
7

ALAMEDA POINT

IR Site 31 - Marina Village

- U.S. Coast Guard Housing
- Recent investigations indicate 9% of soil samples were above screening levels for PAHs in soil samples from the fill material
- Low levels of benzene in groundwater
- Groundwater contamination is most likely from an offsite source
- SI report in progress

8



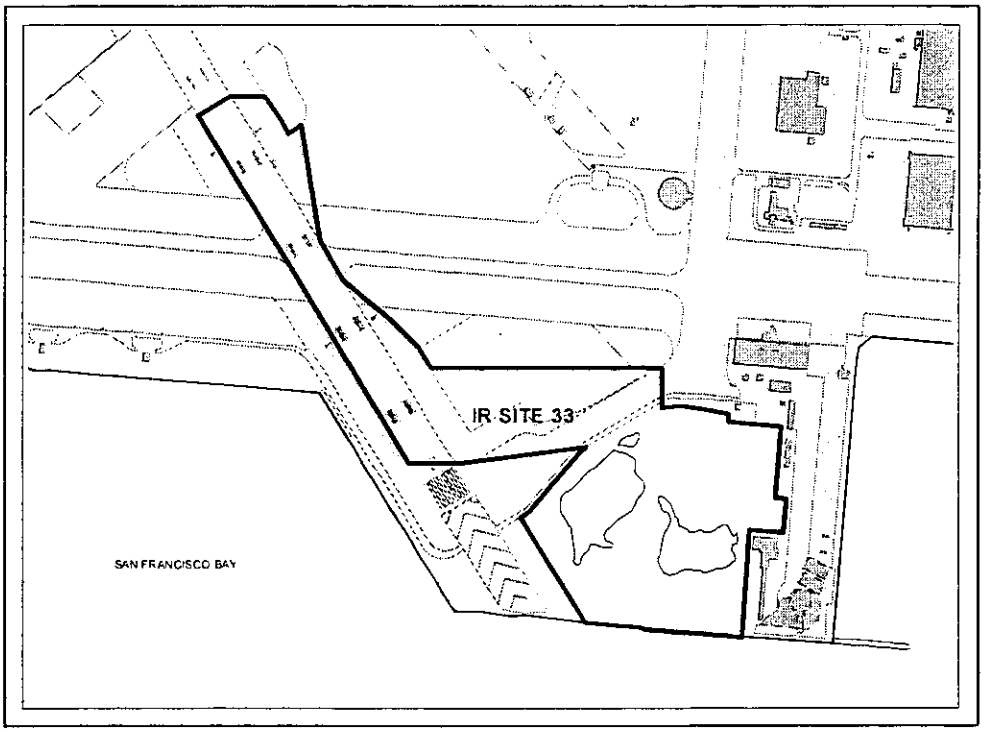
9

ALAMEDA POINT

IR Site 32 - Northern Ordnance Storage Area

- Site use
  - Weapons storage facility
  - Equipment and aircraft storage
  - Contained two former USTs
- VOCs in groundwater including benzene, chlorobenzene, TCE, DCE, and vinyl chloride
- Navy is currently preparing a work plan to perform RI sampling

10



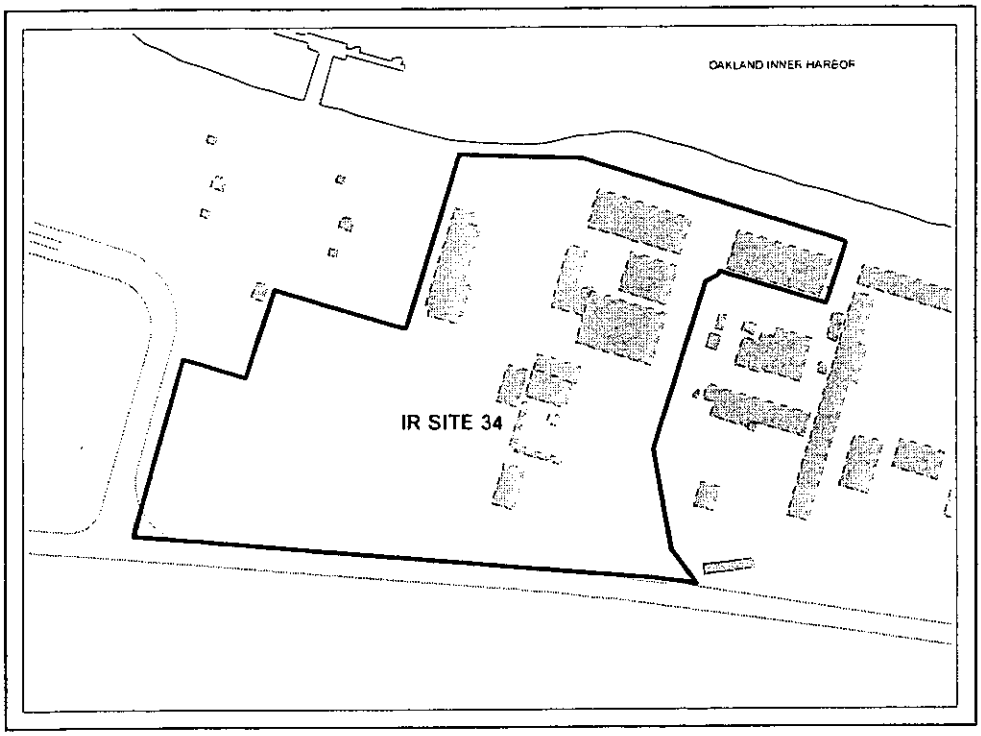
ALAMEDA POINT

IR Site 33 –

South Tarmac and Runway Wetlands

- Portion of former runway and runway wetland area
- Recent investigation indicated soil samples were above screening levels for PAHs in soil samples along runway
- Historic investigation of the runway wetland indicated no significant risk for human and ecological receptors, however outstanding agency issues have yet to be resolved
- SI report in progress

12

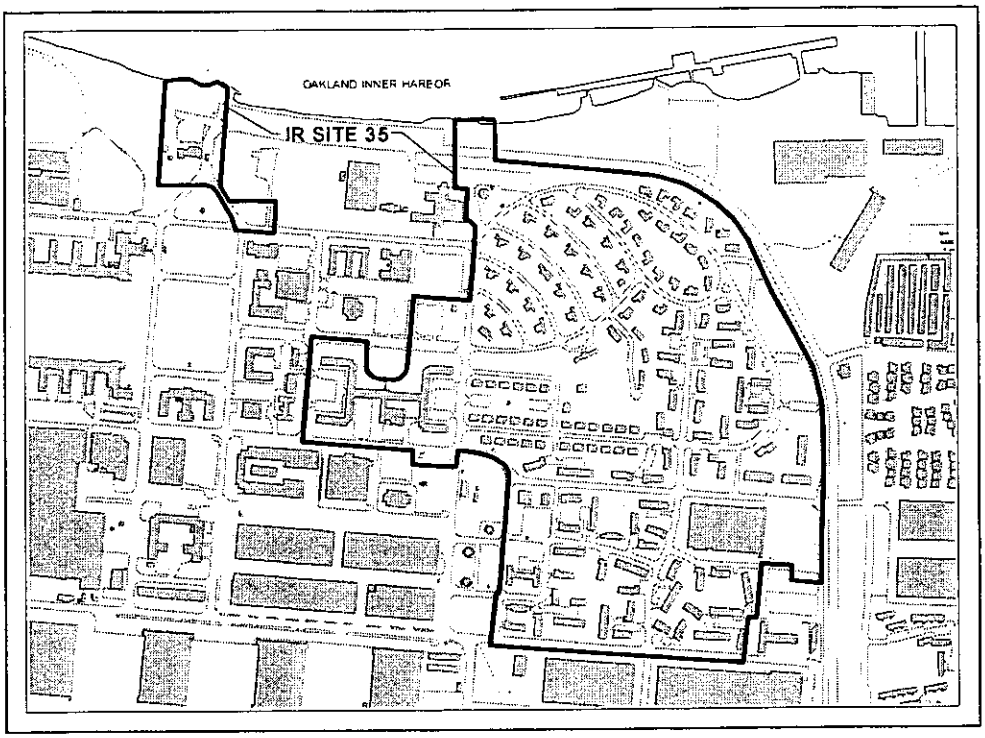


ALAMEDA POINT

IR Site 34 - Former Northwest Shop Area

- Northwest shop area had historic industrial activities
- Environmental Baseline Survey (EBS) reported PCBs above screening levels and arsenic above background levels
- SI report in progress

14



ALAMEDA POINT

IR Site 35 – West Housing Area

- Multi-use area: government housing portion and historic industrial activities
- Recent investigations indicate soil samples were above screening levels for of PAHs
- Time Critical Removal Action (TCRA) for PAHs performed in 2003
- Boundaries of site will be fine tuned during the SI phase
- SI report in progress
- Navy has reserved funds to allow the RI to begin at the completion of the SI

16

ALAMEDA POINT

Proposed RI Schedule

- November 2003 IR Site 32
- March 2004 IR Site 30
- Fall 2004 IR Site 34
- Fall 2004 IR Site 35
- Spring 2005 IR Site 31
- Spring 2005 IR Site 33

17

In-Situ Chemical Oxidation Pilot Scale Tests IR Sites 9, 11/21, and 16

(21 pages)

In-Situ Chemical Oxidation Pilot Scale Tests

NAVFAC
Naval Facilities Engineering Command
SOUTHWEST DIVISION

Shaw The Shaw Group Inc.

Shaw

NAVFAC

In-Situ Chemical Oxidation Pilot Scale Tests

IR Sites 9, 11/21, and 16

RAB Presentation

February 10, 2004

U.S. Navy
Glenna Clark

Shaw Environmental, Inc.
Dan Shafer
Tony Searls

Shaw

NAVFAC

Objective

- Conduct bench scale tests to evaluate effectiveness of oxidants on chlorinated compounds and determine oxidant of choice for pilot scale test
- Conduct pilot scale test to evaluate the effectiveness of oxidant of choice on reducing concentrations of chlorinated solvents in groundwater at IR Sites 9, 11/21, and 16
- Evaluate radial effects associated with application of injected oxidant
- Determine most effective injection approach

Shaw

NAVFAC

Overview

- Project objective
- Sites evaluated
- Chemicals of Potential Concern
- Bench scale test
- Pilot scale test
- Results
- Observations/Conclusions

Shaw

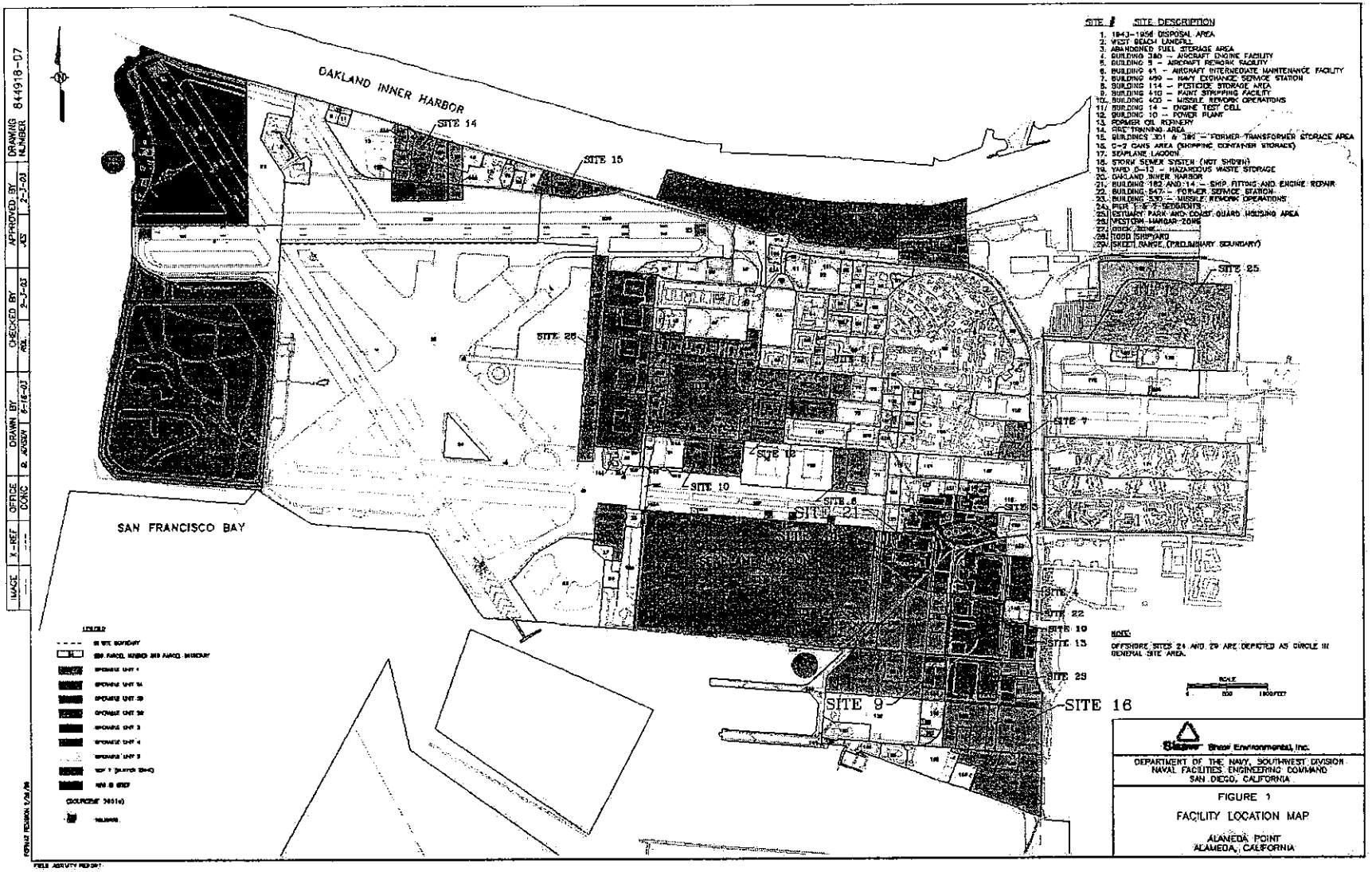
NAVFAC

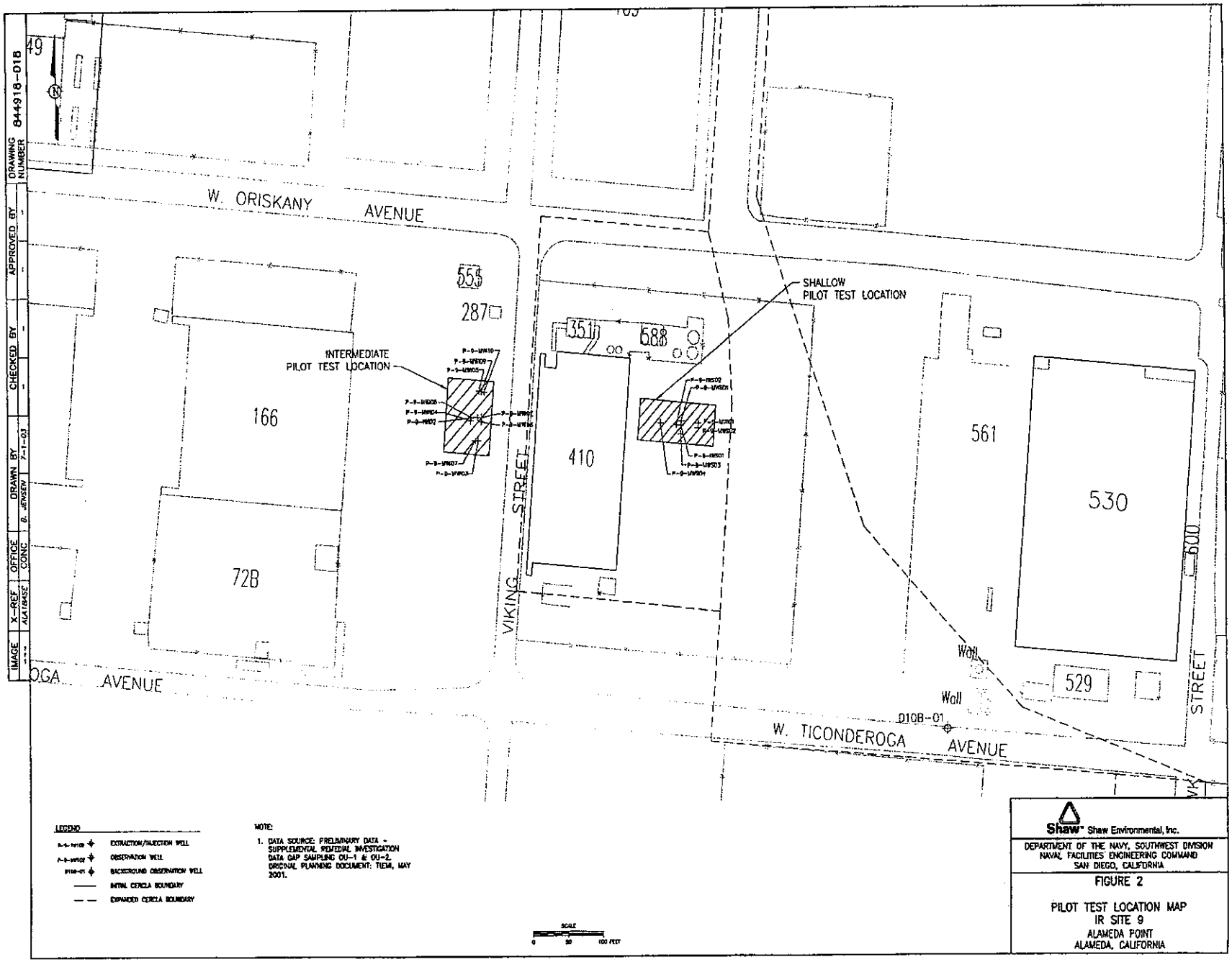
Sites

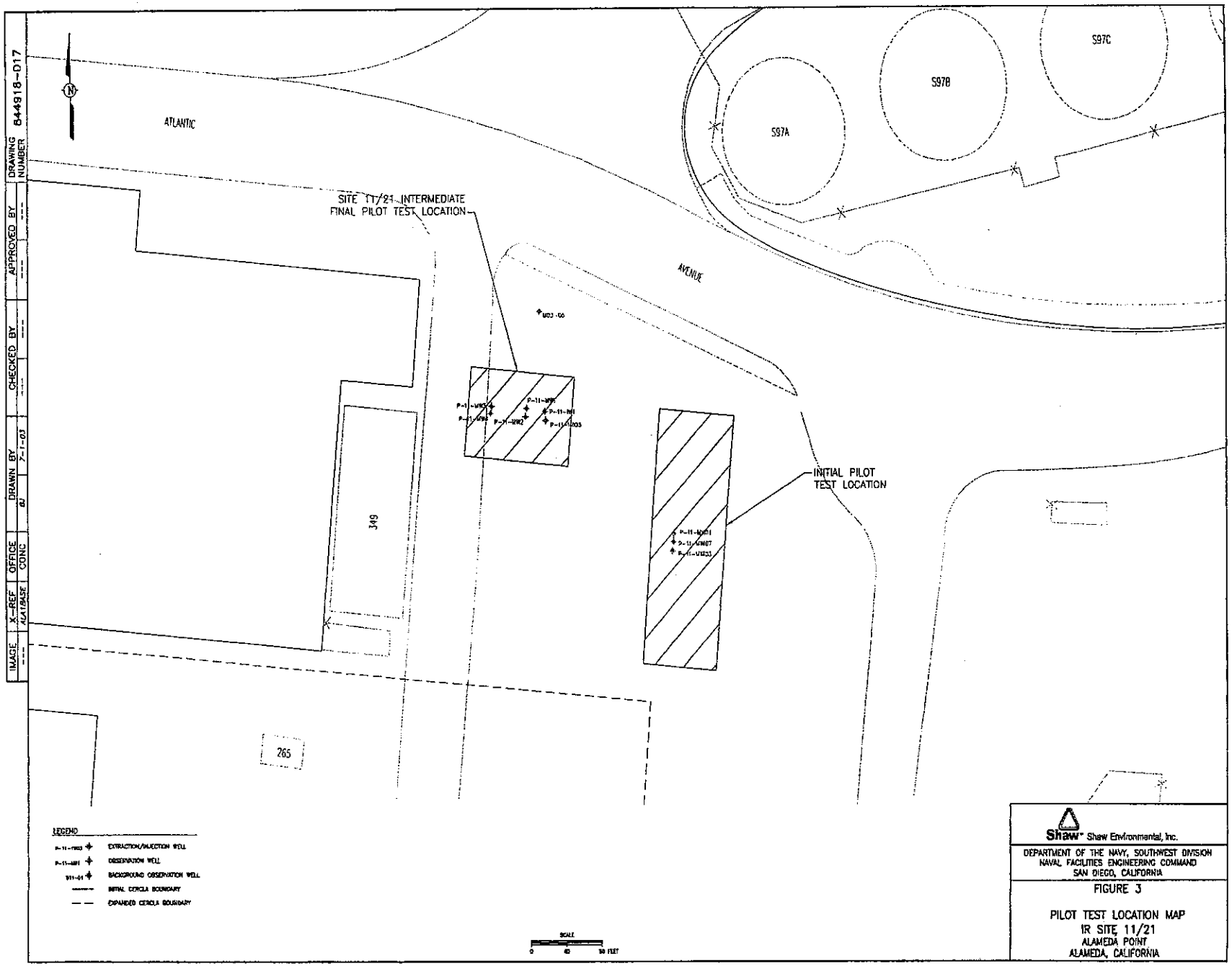
- Site 9 --- Building 410 Paint Stripping Facility
  - 9 Shallow (upper 15 feet)
  - 9 Intermediate (22 to 42 feet bgs)
- Site 11/21 --- Bldg. 14 Engine Test Cell/Bldg. 162 Ship Fitting and Engine Repair
- Site 16 --- C-2 Container Storage Area and Hobby Shop
  - 16 North (CANS and Aircraft Staging)
  - 16 South (Building 608 Hobby Shop)

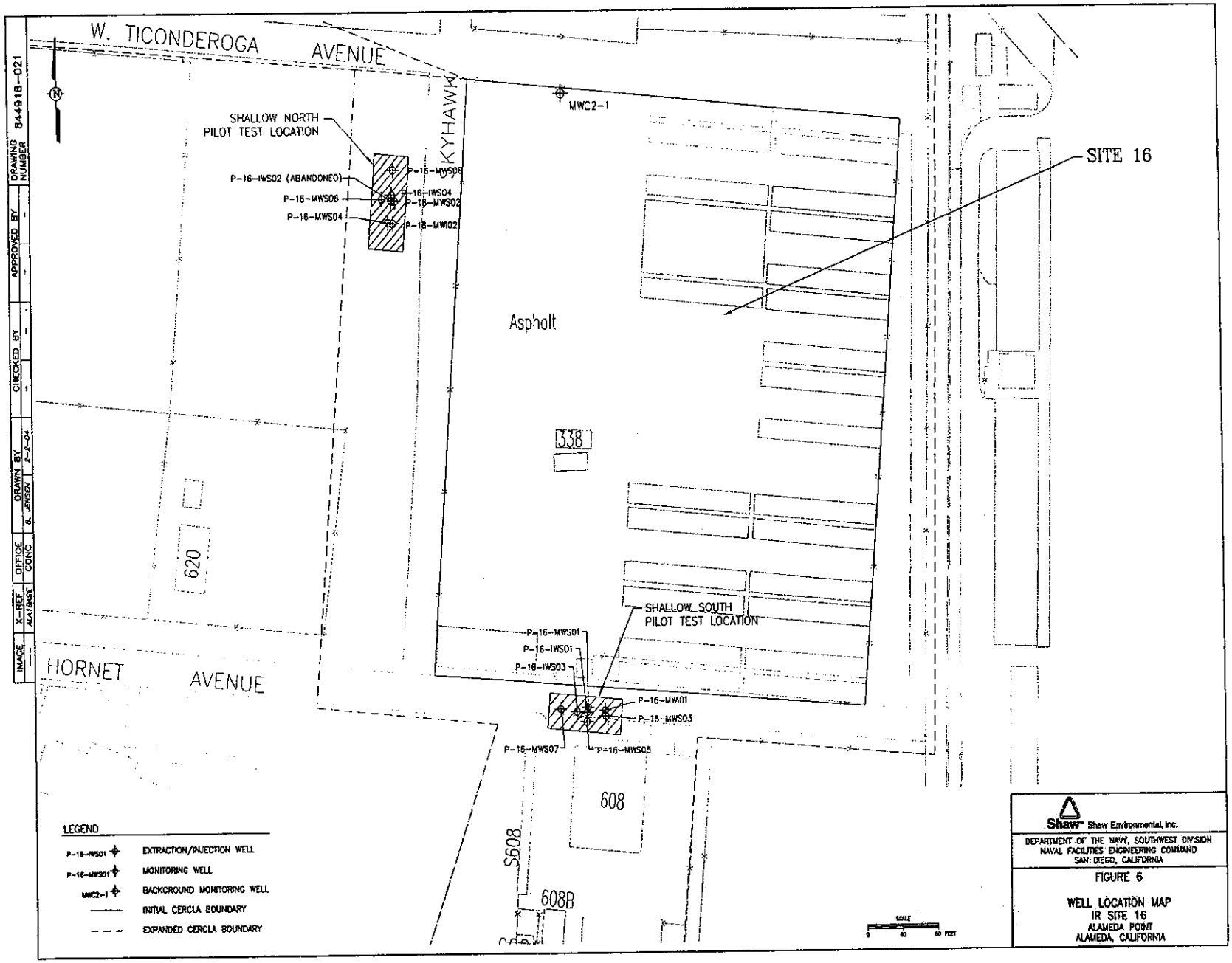
Shaw

NAVFAC


OAKLAND INNER HARBOR
SAN FRANCISCO BAY
SITE 14
SITE 15
SITE 25
SITE 26
SITE 7
SITE 12
SITE 10
SITE 6
SITE 21
SITE 1
SITE 4
SITE 22
SITE 19
SITE 13
SITE 29
SITE 9
SITE 16
SITE # SITE DESCRIPTION
1. 1943-1956 DISPOSAL AREA
2. WEST BEACH LANDFILL
3. ABANDONED FUEL STORAGE AREA
4. BUILDING 360 – AIRCRAFT ENGINE FACILITY
5. BUILDING 5 – AIRCRAFT REWORK FACILITY
6. BUILDING 61 – AIRCRAFT INTERMEDIATE MAINTENANCE FACILITY
7. BUILDING 499 – NAVY EXCHANGE SERVICE STATION
8. BUILDING 114 – PESTICIDE STORAGE AREA
9. BUILDING 410 – PAINT STRIPPING FACILITY
10. BUILDING 400 – MISSILE REWORK OPERATIONS
11. BUILDING 14 – ENGINE TEST CELL
12. BUILDING 10 – POWER PLANT
13. FORMER OIL REFINERY
14. FIRE TRAINING AREA
15. BUILDINGS 301 & 381 – FORMER TRANSFORMER STORAGE AREA
16. C-2 CANS AREA (SHIPPING CONTAINER STORAGE)
17. SEAPLANE LAGOON
18. STORM SEWER SYSTEM (NOT SHOWN)
19. YARD C-13 – HAZARDOUS WASTE STORAGE
20. OAKLAND INNER HARBOR
21. BUILDING 182 AND 14 – SHIP FITTING AND ENGINE REPAIR
22. BUILDING 547 – FORMER SERVICE STATION
23. BUILDING 530 – MISSILE REWORK OPERATIONS
24. PIER 1 & 2 SEDIMENTS
25. DOTWAY PARK AND COAST GUARD HOUSING AREA
26. WESTERN HANGAR ZONE
27. DOCK ZONE
28. TODD SHIPYARD
29. SHEET RANGE (PRELIMINARY BOUNDARY)
NOTE:
OFFSHORE SITES 24 AND 29 ARE DEPICTED AS CIRCLE IN GENERAL SITE AREA.
SCALE
0 500 1000 FEET
Shaw Environmental, Inc.
DEPARTMENT OF THE NAVY, SOUTHWEST DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
SAN DIEGO, CALIFORNIA
FIGURE 1
FACILITY LOCATION MAP
ALAMEDA POINT
ALAMEDA, CALIFORNIA
DRAWING NUMBER 844918-07
APPROVED BY JES 2-3-03
CHECKED BY RDL 2-3-03
DRAWN BY B. JORDAN 6-16-03
OFFICE OAKC
X-REF ---
IMAGE ---


W. ORISKANY AVENUE
W. TICONDEROGA AVENUE
VIKING STREET
INTERMEDIATE PILOT TEST LOCATION
SHALLOW PILOT TEST LOCATION
166
72B
410
561
530
529
555
287
351
688
600
Wall
Wall
D10B-01
LEGEND
EXTRACTION/INJECTION WELL
OBSERVATION WELL
BACKGROUND OBSERVATION WELL
INITIAL CERCLA BOUNDARY
EXPANDED CERCLA BOUNDARY
NOTE:
1. DATA SOURCE: PRELIMINARY DATA - SUPPLEMENTAL REMEDIAL INVESTIGATION DATA GAP SAMPLING OU-1 & OU-2. ORIGINAL PLANNING DOCUMENT: TIEMI, MAY 2001.
SCALE
0
50
100 FEET
IMAGE
X-REF
ALAT8445C
OFFICE
CONC
DRAWN BY
B. JENSEN
7-1-03
CHECKED BY
APPROVED BY
DRAWING NUMBER
844918-01B
Shaw Shaw Environmental, Inc.
DEPARTMENT OF THE NAVY, SOUTHWEST DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
SAN DIEGO, CALIFORNIA
FIGURE 2
PILOT TEST LOCATION MAP
IR SITE 9
ALAMEDA POINT
ALAMEDA, CALIFORNIA


DRAWING NUMBER 844918-017
APPROVED BY ---
CHECKED BY ---
DRAWN BY AJ 7-1-03
OFFICE CONC
X-REF AUTOBASE
IMAGE ---
ATLANTIC
S97A
S97B
S97C
AVENUE
SITE 11/21 INTERMEDIATE FINAL PILOT TEST LOCATION
INITIAL PILOT TEST LOCATION
349
265
LEGEND
EXTRACTION/INJECTION WELL
OBSERVATION WELL
BACKGROUND OBSERVATION WELL
INITIAL CERCLA BOUNDARY
EXPANDED CERCLA BOUNDARY
SCALE
0
40
80 FEET
Shaw Shaw Environmental, Inc.
DEPARTMENT OF THE NAVY, SOUTHWEST DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
SAN DIEGO, CALIFORNIA
FIGURE 3
PILOT TEST LOCATION MAP
IR SITE 11/21
ALAMEDA POINT
ALAMEDA, CALIFORNIA


W. TICONDEROGA AVENUE
KYHAWK
SHALLOW NORTH PILOT TEST LOCATION
P-16-IWS02 (ABANDONED)
P-16-MWS06
P-16-MWS04
P-16-MWS08
P-16-IWS04
P-16-MWS02
P-16-MW02
MWC2-1
SITE 16
Asphalt
338
620
SHALLOW SOUTH PILOT TEST LOCATION
P-16-MWS01
P-16-IWS01
P-16-IWS03
P-16-MW01
P-16-MWS03
P-16-MWS07
P-16-MWS05
HORNET AVENUE
608
S608
608B
LEGEND
EXTRACTION/INJECTION WELL
MONITORING WELL
BACKGROUND MONITORING WELL
INITIAL CERCLA BOUNDARY
EXPANDED CERCLA BOUNDARY
SCALE
0 40 80 FEET
Shaw Shaw Environmental, Inc.
DEPARTMENT OF THE NAVY, SOUTHWEST DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
SAN DIEGO, CALIFORNIA
FIGURE 6
WELL LOCATION MAP
IR SITE 16
ALAMEDA POINT
ALAMEDA, CALIFORNIA
DRAWING NUMBER 844918-021
APPROVED BY -
CHECKED BY -
DRAWN BY G. JENSEN 2-2-04
OFFICE CONC
X-REF ALAMEDA
IMAGE

Chemicals of Potential Concern

- Site 9 Shallow: TMB (Trimethylbenzene), VC (Vinyl Chloride)
- Site 9 Intermediate: 1,1- DCA (1,1-Dichloroethane)
- Site 11/21: TCE (Trichloroethene)
- Site 16 North: 1,2-DCB (1,2-Dichlorobenzene)
- Site 16 South: PCE (Tetrachloroethene), TCE , cis-1,2-DCE (cis-1,2-Dichloroethene)

Shaw

NAVFAC

Bench Scale Test

- Evaluation of various oxidizing agents on soil and groundwater samples to determine oxidant of choice
  - Potassium Permanganate
  - Ozone
  - Sodium Persulfate
  - Hydrogen Peroxide
  - Fenton's Reagent (hydrogen peroxide with ferrous iron)
- Fenton's Reagent was proven most effective in reducing concentrations of COPCs

Shaw

NAVFAC

Applications of Fenton's Reagent

1. Classic Fenton's Approach
   - Injection of H_2O_2 (12%), Fe^{+2}, and acid
   - Requires acidification of groundwater at injection points to a pH < 3
   - Results in temperature increase up to 160° to 180° F
2. Modified Fenton's Approach
   - Injection of H_2O_2 (12 %) and chelated iron catalyst
   - Neutral pH conditions (i.e., no need to acidify GW)
   - Moderate temperature increase (usually < 25° F)
   - Low pressure injection (i.e., < 30 psi)

Shaw

NAVFAC

Peroxide-Based Technology Comparison

	Hydrogen Peroxide	Classic Fenton's Reagent	Modified Fenton's Reagent
Aquifer Acidification Required	No	Yes	No
Controlled Reaction	No	No	Yes
Bioremediation Stimulation	Yes	Limited	Yes

Shaw

NAVFAC

Applications of Fenton's Reagent

- Based on potential health and safety concerns with adding acid to lower pH of groundwater and temperature increase associated with classic Fenton's, Navy and regulators preferred modified Fenton's approach.

Shaw

NAVFAC

Pilot-Scale Tests – November 2002

- Design data collection via CPT, Hydropunch (Sites 9 and 16 only)
- Injection well installation
- Monitoring well installation at varying distances from injection well to evaluate radius of influence
- Aquifer testing
- Baseline samples collected for analysis of VOCs, etal.
- Injections conducted at all sites over a 1-week period
- Post-injection groundwater samples collected following completion of injections

Shaw

NAVFAC

Results

Site 9 Shallow

Compound	Well	Distance from Injection Well	Baseline (ug/L)	Week 1 (ug/L)	Week 2 (ug/L)	Week 3 (ug/L)	Week 4 (ug/L)	Overall Percent Reduction
1,2,4-Trimethylbenzene	P9-MWS04	23 feet	130	150	89	74	52	60%
Vinyl Chloride	P9-MWS04	23 feet	99	54	53	55	49	51%

Site 9 Intermediate

Compound	Well	Distance from Injection Well	Baseline (ug/L)	Week 1 (ug/L)	Week 2 (ug/L)	Week 3 (ug/L)	Week 4 (ug/L)	Overall Percent Reduction
1,1-Dichloroethane	P9-MWI05	32 feet	350	260	410	300	310	11%
1,1-Dichloroethane	P9-MWI06	7 feet	380	390	360	380	380	0%
1,1-Dichloroethane	P9-MWI09	31 feet	1200	1000	710	490	890	26%

Shaw

NAVFAC

Results

Site 16 North

Compound	Well	Distance from Injection Well	Baseline (ug/L)	Week 1 (ug/L)	Week 2 (ug/L)	Week 3 (ug/L)	Week 4 (ug/L)	Overall Percent Reduction
1,2-Dichlorobenzene	P16-MWS06	11.5 feet	36	ND	2.5	ND	2.5	93%
Chlorobenzene	P16-MWS06	11.5 feet	23	ND	2.1	ND	1.3	95%

Site 16 South

Compound	Well	Distance from Injection Well	Baseline (ug/L)	Week 1 (ug/L)	Week 2 (ug/L)	Week 3 (ug/L)	Week 4 (ug/L)	Overall Percent Reduction
PCE	P16-MWS07	18.5 feet	430	51	100	75	43	90%
TCE	P16-MWS07	18.5 feet	90	13	26	21	10	89%
Cis-1,2-DCE	P16-MWS07	18.5 feet	190	19	34	30	10	95%

Shaw

NAVFAC

Results

Site 11/21								
Compound	Well	Distance from Injection Well	Baseline (ug/L)	Week 1 (ug/L)	Week 2 (ug/L)	Week 3 (ug/L)	Week 4 (ug/L)	Overall Percent Reduction/ (Increase)
TCE	P11/21-IWI01	4 feet	8100	4700	8100	5600	8500	(5%)
TCE	P11/21-MW01	12 feet	3200	2400	3900	2400	4300	(34%)
TCE	P11/21-MW02	11.5 feet	12000	11000	16000	12000	7900	34%
TCE	P11/21-MW03	31 feet	4800	4800	7900	4300	5500	(15%)
TCE	P11/21-MW04	31 feet	15000	9800	17000	12000	14000	7%

Shaw

NAVFAC

Observations/Conclusions

Field Summary Report submitted July 4, 2003

- Site 9 Shallow
  - Up to 60% reduction in contaminant concentrations
  - 20- to 25-foot radius of influence
  - Recommend for full-scale application

- Site 9 Intermediate
  - Insufficient quantity of oxidant injected to measure effectiveness and radius of influence
  - Surfacing observed at expansion joint in concrete
  - Recommend re-do of pilot test with different injection well configuration/construction

Shaw

NAVFAC

Observations/Conclusions

- Site 11/21
  - Initial reduction in TCE concentrations following injection
  - Rebound to near-baseline concentrations by Week 4 sampling
  - Rebound likely due to desorption of dense non-aqueous phase liquid (DNAPL)-range concentrations from aquifer material
  - Recommend pilot test at upgradient DNAPL source (Site 4) with multiple injection events

Shaw

NAVFAC

Observations/Conclusions

- Site 16 North
  - Over 90% reduction in contaminant concentrations
  - 15- to 30-foot radius of influence
  - Recommend for full-scale application
- Site 16 South
  - Over 89% reduction in contaminant concentrations
  - Over 20-foot radius of influence
  - Recommend for full-scale application

Shaw

NAVFAC

Six-Phase Heating Pilot Test Results at Plume 5-1

(14 pages)

Six-Phase Heating Pilot Test Results, Plume 5-1 Alameda Point, CA

Six-Phase Heating DNAPL Removal Pilot Test Results IR Site 5

February 10, 2004

U.S. Navy
Glenna Clark
Remedial Project Manager

Shaw Environmental, Inc.
Rudy Millan, P.E.
Technical Lead

NAVFAC

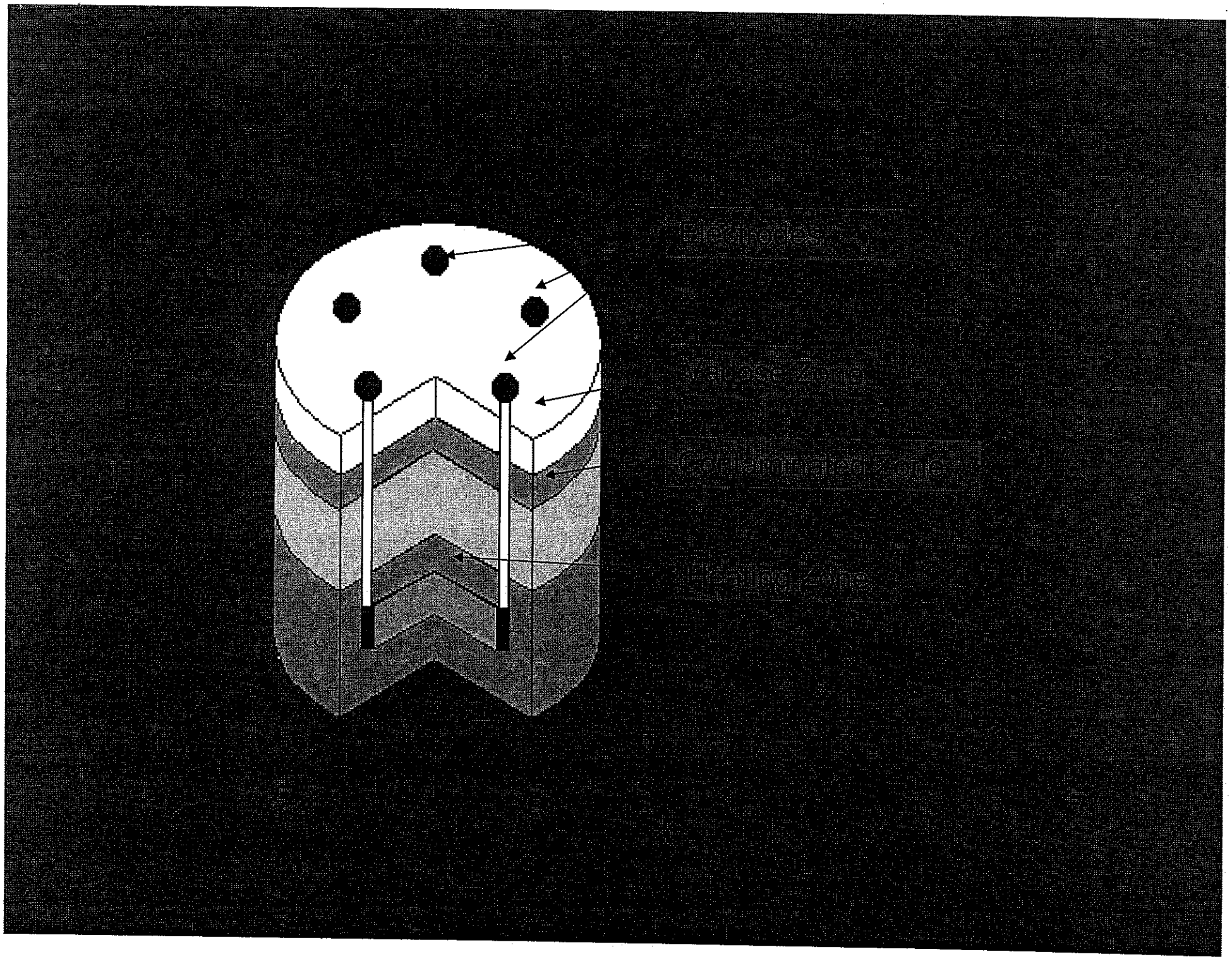
What is Six Phase Heating?

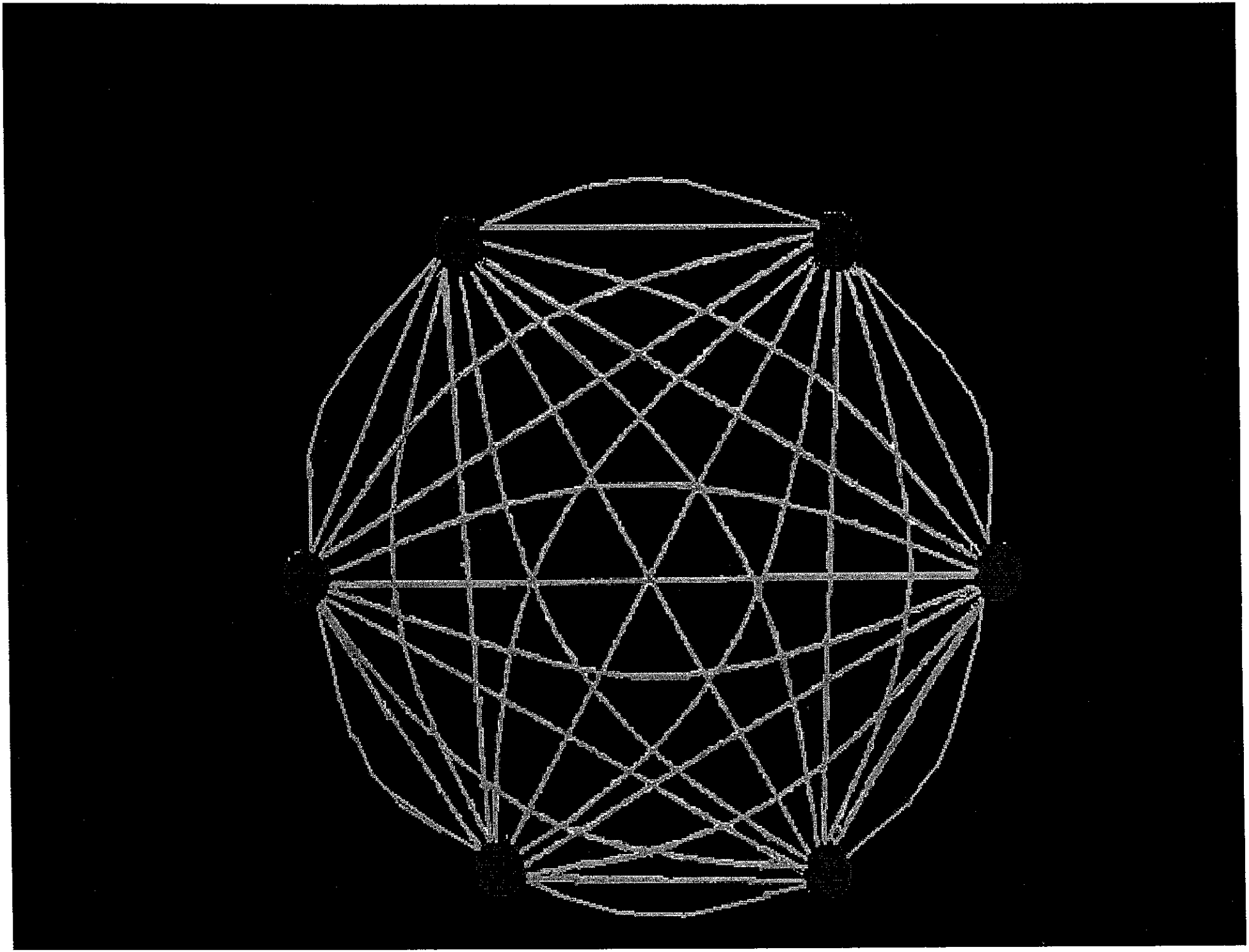
- An Aggressive Remedial Technology
- Addresses Volatile Compounds from Soils and Groundwater
- Heats Ground by Applying Electrical Currents
- Characterized by Short Timelines
- Can Remove Hard-to-Reach Contaminants

How Does SPH Work?

In Effect: In-Situ Steam-Stripping

- Electrical Application of Heat
  - Generates Steam
- Steam Provides Upward Transport
- Vapor Extraction Removes Steam


Electrodes
Vadose zone
Saturated zone
Bedrock

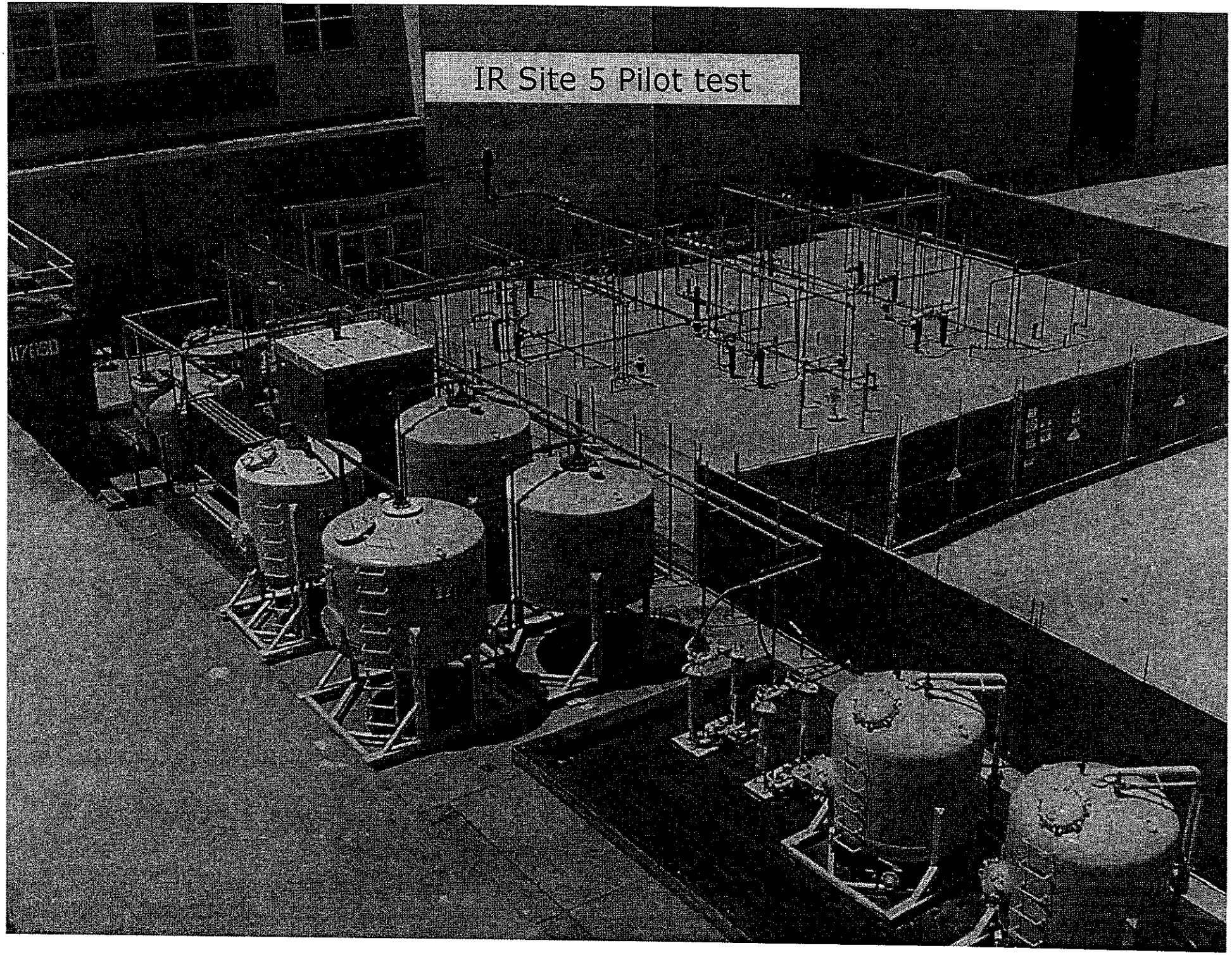


Specialized Equipment Used

- Electrical Utility Power 0.5 to 2 MW
- Six-Phase Power Control Units (PCU)
- Condensing VE/Treatment System

Contaminants of Concern

- TCE
- *cis* 1,2 DCE
- *trans* 1,2 DCE
- 1,1 DCA
- 1,1 DCE
- 1,1,1 TCA
- 1,2-DCA
- 1,1,2-TCA
- PCE
- Vinyl Chloride

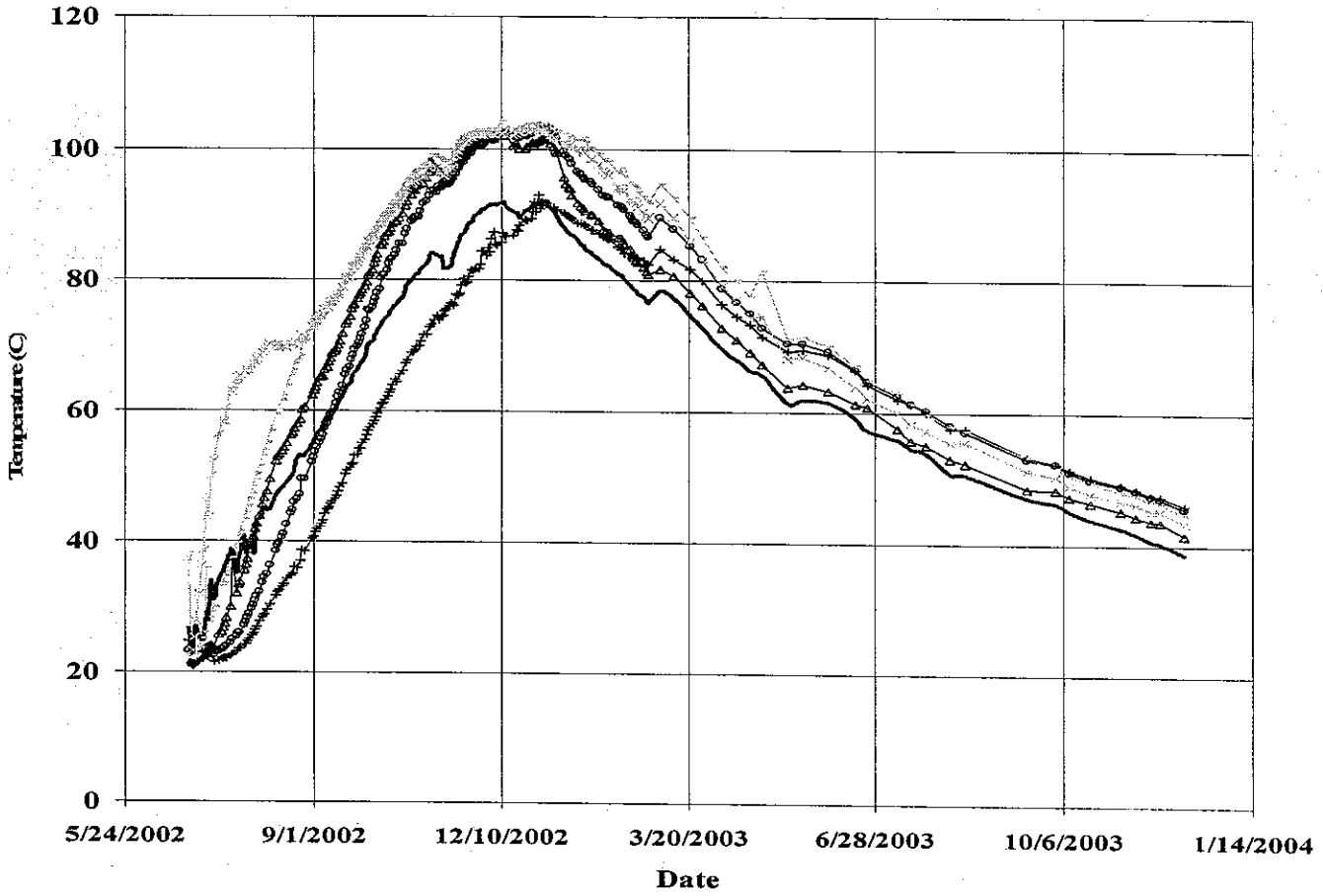

IR Site 5 Pilot test

Pilot Test Results

- Duration of Pilot Test: 6 Months
- Total Power Consumed: 420,000 kWhrs
- Short-Term Effectiveness: 99%+
- Effectiveness After Rebound: 86%

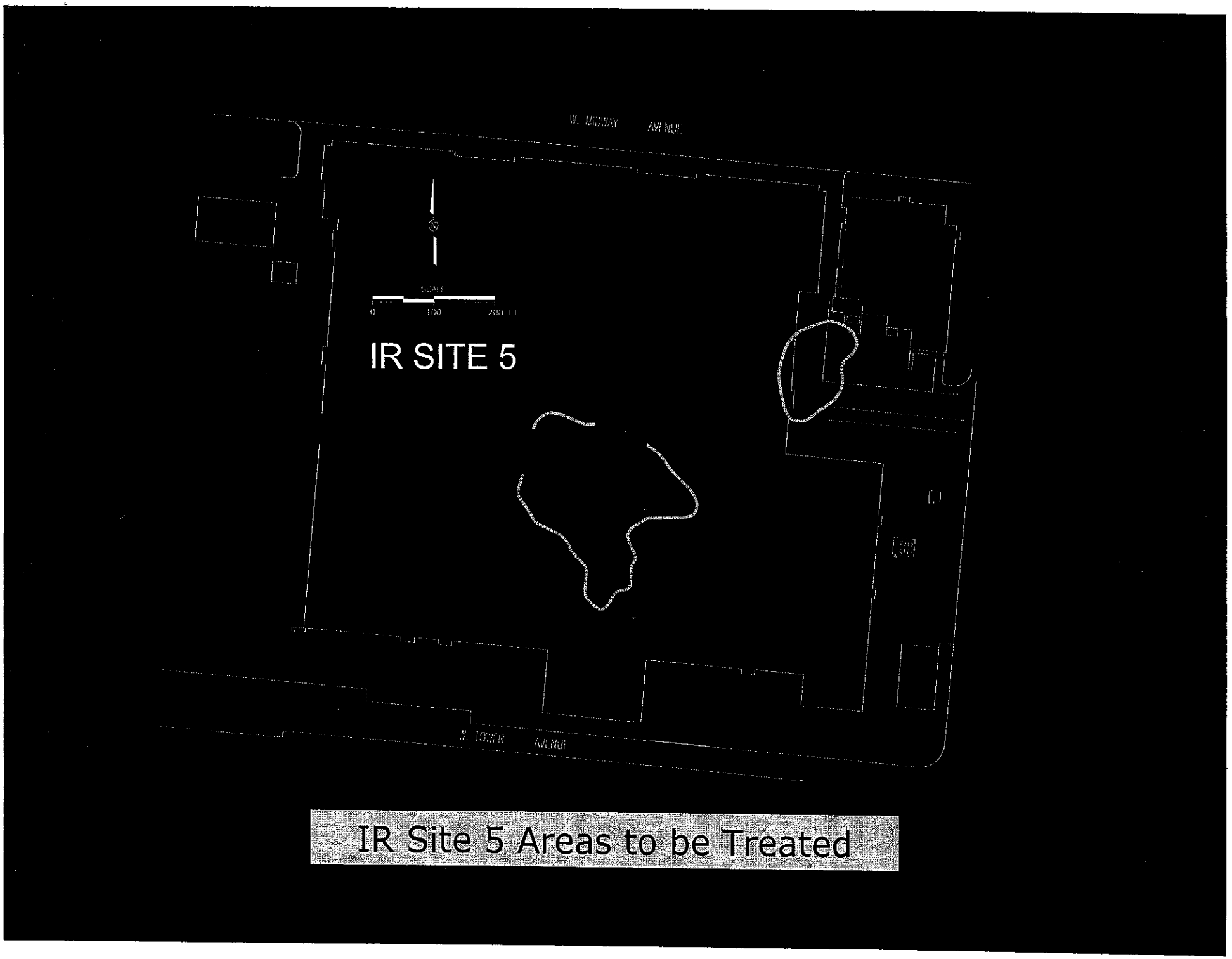
	Before Test		At End of Active Heating		10 Months After Pilot Test	
Parameter	Average	Highest	Average	Highest	Average	Highest
Temperature (deg C)	22	22	92	104	48	53
Total VOC Content (ppb)	9600	34500	130	700	1300	7300

Temperatures During Pilot Test



Current Status

- DNAPL Plumes Defined
- Pilot Test performed at IR Site 5
  - Successful
  - Scale-up Data Set
- Two Plumes at IR Site 5 to be Treated
  - Plume 5-1
  - Plume 5-3
- Plume 5-1 Design Complete
- Plume 5-1 Construction 95% Complete



IR Site 5 Areas to be Treated

Summary

- SPH Pilot Test Successful at IR Site 5
  - Solid Data Set Available for Scale-up
  - Able to Achieve Mass Removal Goals
  - DNAPL Removal Pilot Test Report, May 2003

BCT Updates for February 2004 RAB Meeting

(1 page)

BCT UPDATES FOR FEBURUARY 04' RAB

SITE	STATUS
IR SITES	
Site 1	• Draft FS to be revised • Final Geotechnical FS
Site 2	• **Navy is developing Supplemental RI Sampling Workplan to address the deficiencies of the RI submitted @ 3 years ago; BCT met on 1/14/04 to tour the site visit and scope out the sampling plan** • **Draft geotechnical FS; agency comments submitted**
Site 4	Draft final Pilot-scale Chemical Oxidation Work Plan (Removal Action)
Site 5	Final DNAPL Removal Action Project Plan Addendum
Sites 9 and 16	Final Full-scale Chemical Oxidation Work Plan (Removal Action)
Sites 14 and 15	Draft Proposed Plan
Site 17	Final RI
Site 25	• Draft final Soil FS • **Draft groundwater RI/FS; agency comments submitted (DTSC comments partially submitted)**
Site 26	Draft FS
Site 27	**Navy proposes to conduct supplemental sampling to collect additional soil and soil gas samples to incorporate into the RI; a presentation was made in the monthly BCT meeting on 1/20/04.**
Site 29	Draft final RI
Non-IR Sites	
EDC-3, EDC-5, PBC-1A, EDC-12, EDC-17, EDC-21, PBC-3, FED-1A	**Navy is working on the revised Draft Site Inspection Reports; BCT met on 2/10/04 to discuss ways to best integrate EBS data with 2003 PAH data**